BULLETIN OF THE

TAYLOR SOCIETY

A SOCIETY TO PROMOTE THE SCIENCE AND THE
ART OF ADMINISTRATION AND OF MANAGEMENT

JUN 19 1922

MILLS AND MINDS, *by Arthur Pound*

BUDGET CONTROL, *by George E. Frazer*

SUPERSTANDARDS, *by F. B. and L. M. Gilbreth*

SALES RESEARCH, *by John M. Holcombe, Jr.*

Engineering Societies Building
29 W. Thirty-Ninth St.
New York

JUNE, 1922 VOL. VII., NO. 3

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COMMENT

READERS of Mr. Pound's interesting address in this issue should have in mind the author's background. He resides in a Michigan city which has in twenty-five years grown from a country village of some three thousand inhabitants to an industrial community of a hundred thousand, devoted almost exclusively to the manufacture of automobiles. The automobile industry is probably as mechanical and repetitive as any of our great industries. The individual job is highly specialized and standardized. The material passes to and from the work-place with rapidity. In certain processes heavy machinery working on metal creates an environment of noise.

IT is therefore not surprising that Mr. Pound, apparently generalizing from facts observed in that particular industry, should unconsciously over-emphasize, as we believe he has, the autocracy of the "Iron Man" which he believes dominates the individual workers in modern industrial technique. We say *over* emphasize, for, while there is undoubtedly such an autocracy, we believe it is an aspect of indifferent management and remediable, rather than inherent in mechanized, repetitive, specialized and standardized processing. Significant as is the author's contribution to the study of the human problems in industry, we believe that he offers as the premise of part of his reasoning, certain generalizations which are not based on adequate observation and analysis of the facts.

AS we understand it, Mr. Pound's argument in his address and in his book, is essentially as follows: Modern mechanized, repetitive, specialized and standardized processing has brought about a condition in which the workers must apply themselves to tasks which are performed in an environment of noise, speed and nervous tension, and which offer little variety and therefore little opportunity for initiative and self-expression; tasks which may be performed by workers who are not skilled, and of whom the great number places the workers in a disadvantageous bargaining position which results in an "insecurity of the job"; that the lack of interest in the job and the insecurity of tenure create individual discontent and general industrial unrest; that all of this is inherent in modern industry and must be accepted; and that a remedy is a shortening of the hours of labor and an education of the worker for better enjoyment of the hours outside the shop to compensate him for the disagreeable hours in the shop.

WE must confess a great interest in the remedy suggested. We believe an education for the more profitable and enjoyable utilization of leisure time is as important for the workers as for professional men (in the *Atlantic Monthly* some ten years ago appeared an article by President Tucker on education for the proper disposition of the leisure time of the educated man). We believe that our educational methods and educational values need reappraisal. It may be that, as Mr. Pound suggests, our public school education should aim better to prepare the man for life outside of industry, and, as Mr. Feiss suggests, industry itself should take over the responsibility of training men for more effective application in industry. If industry should establish its own technical schools and require of the young people who enter them an education in the public schools whose object would be to give general information concerning social processes and problems, and develop the inherent capacities of intelligence and adaptability, then perhaps our workers would be better prepared for competent self-expression in work and enjoyable and profitable self-expression outside of working hours.

WITH respect to Mr. Pound's conclusions concerning the influence on the individual worker of mechanized, repetitive, specialized and standardized processes, we are not convinced. We believe he draws general conclusions from the exceptional case. Mr. Feiss, in discussion of Mr. Pound's address, challenges several of these generalizations. He challenges the assumption that there has been, since the days of household industry and of the small factory, a decline in the conditions of well-being and of happiness of the worker. The worker commands more with the proceeds of a shorter working day than with the proceeds of an earlier longer working day. He also challenges the statement that repetitive and specialized operations are necessarily monotonous and subversive of individual initiative and self-expression. In general the repetitive operation which becomes automatic is less exhausting physically and mentally than the operation which requires constant attention in order to meet the unforeseen next element in the operation. The operation which is repetitive and automatic is performed by the subconscious self, leaving the conscious self free for other things. He also challenges the assumption that the repetitive and automatic operation cannot in itself be made a skilled operation and correspondingly interesting. That is one purpose of scientific management in seeking the "one best way" and teaching the operator the why and how of it.

IN the discussion by Whiting Williams this last point is brought out clearly in the illustration of the job of the locomotive fireman. The fireman demonstrated to Mr. Williams that his job was a skilled one, and that the success of the locomotive driver depended upon the excellence of the fireman's performance. It was a joy to him to do it well. As this pleasure in the job developed, monotony tended to disappear. Mr. Williams presented the point of view that every operation, no matter how apparently simple, no matter how apparently repetitive and automatic, has its elements of skill and of interest for the worker, provided these elements are brought out and made clear to him. The elements of skill give the opportunity for initiative, self-expression, comparative excellence of performance and personal interest in work. The problem is one, then, not of accepting something believed to be inherent in specialized, repetitive operations, but of avoiding something believed not to be inherent in such operations. It is a problem of good management, pure and simple; of management's accepting the responsibility of leading in the search for the one best, most skillful way of performing an operation, of selecting and assigning workers to operations in accordance with their capacities for skill, and of teaching them when assigned the best way, the why and how of it, its relation to all other operations, and to the efforts of the enterprise as a whole. There is nothing new in this—it is good Taylor doctrine—but it is not practiced in conventional management.

WE believe, therefore, that there remains to be proved the assumption by Mr. Pound and other writers, that monotony, fatigue and absence of the opportunity for initiative and self-expression are inherent in most modern technical processes. There should be a serious, competent investigation of that problem which will positively confirm or disprove the assumption. There are two fundamental questions to be answered by such an investigation: What are the operations which are monotonous, fatiguing and subversive of initiative and self-expression under conventional methods of management? Which of these operations must remain in that class under the method of management which discovers and specifies the elements of skill in each operation and teaches these to the worker. On the other hand, we believe that the feeling of "insecurity on the job" and the wage received for the job have a profound influence on the mind of the worker and are the primary causes of his discontent. Given a secure job, a just share of the income from productive activity, a knowledge of the elements of skill in an operation and an opportunity to manifest individual skill, we believe that workers would not complain about the monotony and fatigue of their occupations any more than do the executive, the farmer, the lawyer, the teacher, the merchant and the dentist.

NEXT MEETING—NEW YORK, NOV. 23-25

MILLS AND MINDS[1]

SOME OBSERVATIONS ON THE INFLUENCE OF SPECIALIZATION AND REPETITIVE PROCESSING ON THE MINDS OF WORKERS

BY ARTHUR POUND[2]

TO invite a writer to come down here from Michigan to talk to engineers seems to me to be rather the triumph of hope over experience, because you have probably had enough experience with writers to know that though they may write like angels, they talk like poor "Pol," as Sheridan said of Goldsmith.

There was a time when I dreamed of being an engineer. Our old family doctor—one of those family doctors in the good old days who always took a proprietary interest in anything he had assisted in bringing into the world—sort of picked me out for an engineer; but when I was a lad in high school, I went once into the north woods and came back with some of the Paul Bunyan stories. All through the north woods Paul Bunyan is what you might call the hero of the lumber camps. If anything wonderful happens, Paul is the hero; in fact, they hire men to amuse the lumber jacks by telling them Paul Bunyan's stories; and, as I always had an active imagination, I made up some of my own stories. In one of them this Paul was sent one day for a copper kettle—to bring it back through the woods. Passing through the woods he was attacked by mosquitos, and with rare presence of mind he turned the kettle upside down and crept under it. Whereupon the mosquitos began to bore. Presently their bills began to come through the kettle, and, again with rare presence of mind, Paul took his hand-axe off his belt, and as the bills came through, he clamped them one after another inside the kettle. Presently he felt the tug of the kettle, and then the kettle went up in the air with the mosquitos. The other boys said that Paul traded his kettle for a bottle of hooch.

Another famous Paul story of the Northwest that I brought back and told the doctor was that one damp morning Paul was told to take a team with a load of logs, and the only harness he could find was a fresh rawhide harness. He loaded his logs and drove his team away, but you know how rawhide stretches. The harness stretched and stretched but didn't move the logs. When he arrived with the team they asked him where the logs were. His reply was, "Hitch this harness to a tree and the logs will come in." They did so, and presently the sun came out and dried the rawhide so that it tightened up and in came the logs.

I told these stories to the family doctor, the one who wanted me to be an engineer; whereupon he said, "My boy, you will never make an engineer; engineering is an exact science; an engineer cannot deceive even himself." So, on his advice I became a newspaper man. For twenty years I have been living and working in factory towns, in Indianapolis, Detroit, Grand Rapids, and in Pontiac and Flint, Mich.,—all of them towns pretty much alike. And you know how it is with a newspaper man; he has to keep his mind and his office open to all comers. I do not think there is any sort of product of the public schools that I have not been close to, worked with, hired and fired. There is hardly any sort of man in industry that I have not heard through to the end of his string, and some of them are very long indeed, particularly if they have got something they want to put over. I have been reporter, editor and manager of printing plants and newspaper properties. I have hired and fired, and been hired and fired. I have negotiated on either side of the council table. I have had enough experience in business to have made me a business man if I could have assimilated it. I have chased the payroll around the block both ways, to get money due and to get money from creditors to pay money due. And that is an experience without which no one can claim a knowledge of business. But I have remained a newspaper man. That is or ought to be something quite different.

Business men have to be specialists, engineers have to be specialists, but a newspaper man ought to be a generalist. He must know a little something about everything and not too much about anything.

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[1] An address delivered at a meeting of the Taylor Society, Philadelphia, March 17, 1922.

[2] Editor and Writer, Flint, Mich.; author of "The Iron Man" (Houghton Mifflin & Co.).

The raw material of the newspaper is Life, and life is something which insists upon unity. While you can take it apart in theses and books, you cannot do so in actuality without very serious and oft-times ludicrous results. There is a sad, sad story of old Judd Hawkins and his boy. The father took the boy at an early age—when he was a mere infant—up into the woods of Minnesota to raise horses. The lad grew up there in the wilderness completely surrounded by horses. His mother was dead. He arrived, in fact, at the age of twenty-one without having seen a railroad train, a school or a woman, and at that time his father thought perhaps he was not doing right by the boy, was not giving him a broad enough experience of life. So he said, "My boy, we will go down to Duluth," and they drove out through the clearing and got a train. On the train the boy said, "Dad, what is that?" The father said, "My boy, that is a woman. Now take good notice of her because the chances are that some day you will marry a woman. In fact, when we get to Duluth, I want you to meet some nice young ladies, marry one and bring her back to the ranch. I will give you the ranch and you can bring her back—the ranch will be yours. I will go down East, visit around the old homestead, and then come back to see you." The father's program went through beautifully, but when he returned he found the boy looking very blue and downcast. He asked, "What is the matter? Where is the wife?" And the boy said, "Dad, it's a darn shame; a couple of days ago she went out here after a pail of water, fell over that stump and broke her leg and I had to shoot her." This boy knew nothing but horses, horses, horses; and that illustrates, you see, very neatly, the danger of over-specialization. Now it so happens that when a man seizes upon some particular field as his to till, and tills it diligently, he has to keep his eyes on the ground, he cannot go galivanting away across the fields. And in that situation he is apt to forget that there is a New Jerusalem beyond the hills and a House of Sorrow down in the valley. The newspaper man can never forget those things.

In the present situation we find that specialists have been multiplying at a rapid rate and that generalists are getting more and more scarce. They are as scarce as pessimists at a chamber of commerce dinner. And that is rather a pity, because with every development in a specialty we get back sooner or later to the truth that life is still a unity, that it is still one and cannot be taken apart any more than Judd Hawkins could take it apart when he tried.

That establishes the point of view from which I want to speak to you on Mills and Minds. I cannot profess to give you an expert opinion on machinery, on psychology, on sociology or anything else; but where these cross in the tangled skein of existence it has been my lot to stand, and perhaps my testimony may be of some interest, if not of particular value. I am quite sure that you think it may be of some value, or you would have not taken the bother to invite me down here; and that the world in general is becoming interested in this problem may be due in part to the reaction to certain articles of mine which appeared in the *Atlantic Monthly*. Those articles were written under the conviction of necessity, with the idea, not that I was particularly fitted to do the job, but that it needed doing and nobody else seemed to have done it. In other words the author had no particular authority, but the ideas, at that particular time, had some authority. A good many people, I think, must have been reflecting upon one of the great problems of our age, the conflict between a mechanized civilization on the one hand, and, on the other, that culture of the active soul which Emerson says is the finest flower of democracy. Now the major implications of these articles have not been seriously questioned. I have had a great deal of correspondence about some of the minor points therein, but on the other hand, verification of many points has come from a good many quarters in the industrial field.

It is quite obvious that manufacturing is getting to be a contradiction in terms, since the hand, the *manus*, is being left out of the equation and the machine is being substituted for it. The Germans, with their penchant for verbal exactness, seem to have gotten nearer the reality in their word *Mechanofabrik* to define the quantity production of standardized goods through the control of natural forces and mechanical processes. There are two important elements in *Mechanofabrik*. One is a division of labor and the other is the transfer of skill from the man to the machine. Adam Smith said that in his opinion the corporate form of management could be applied successfully only to banking, life insurance companies and other activities that could be easily routinized. He did not see that the application of machinery to production would permit the routinizing of practically all lines of business to such an extent that we can now say that the corporation is the standard organization for manufacture.

The transfer of skill from the man to the machine first appears as an idea with Sir Samuel Bentham, brother of Jeremy Bentham, the philosopher of pleasure and pain. Sir Samuel Bentham was in Russia about 1785. That was twenty years after the invention of the steam engine, and about ten years after Wilkinson had made the steam engine a practical force, not only in producing goods but also in pushing civilization, by inventing his boring machine with which, in 1776, he produced fifty cylinders machined closely—to the standard of a thin sheet of paper. That was the great year also when the search for freedom was begun on these shores of ours. Ten years thereafter Bentham was in Russia, commissioned to build a fleet for the empress of Russia on the Black Sea. He had no skilled labor at his disposal; he was one Englishman alone in Russia, out of his proper element, an engineer, a man of force, intelligence and vigor. He conceived the idea of making wood-working machinery so that the raw Russian labor could be applied to the production of the required vessels. He was unable to make his dream come true there, but on his return to England he became First Lord of the Admiralty, and was in a financial position to succeed. In certain patents, filed first in 1793 and again in 1795, he outlined a complete series of woodworking machinery for the manufacturers of ships, blocks and tackle.

He was unable to put government funds into this work, by reason of being First Lord of the Admiralty, and, with the help of Brunel, a French engineer with some experience, those machines were built in the shops of Henry Maudsley, the great British tool maker, and installed at Portsmouth. This installation begun in 1805 and completed in 1808, represents the first factory of interchangeable machinery in the world. That machinery immediately multiplied the working power of the individual by ten; that is to say, one man could produce as much in blocks and tackle as ten men had produced before. That was one great influence in helping the British sweep the seas of foreign shipping and bring Napoleon to St. Helena, a prisoner. In fact, then and there England's position as the creditor nation of the world was consolidated.

In this country Eli Whitney, after being bilked of the profits of his cotton gin, came north, borrowed money and in New Haven established his arms plant, which plant is still in existence greatly enlarged. There, in the manufacture of small arms, he too applied his wonderful mind to the transfer of skill from man to the machine; and in 1812 his plant was in such a condition that in applying to the government at Washington for an arms contract, he could describe it as follows: "Its great leading object is to substitute correct and effective operation of machinery for that skill of the artist which is acquired wholly by long practice and experience—a species of skill which is not possessed in this country to any appreciable extent."

From these beginnings skill has been transferred from man to machine until, in all industrial operations, which are of the utmost social significance because of the large numbers employed and the great quantity of goods produced and consumed, the rank and file of workers are coming to have less opportunity to express personality through toil or to escape from monotony imposed by machine cycles beyond their control. The fires of competition have distilled skill from the broad lower reaches where the common man works, and have concentrated it in the higher thought compartments. Executives, managers, engineers, inventors, designers, tool-makers, shop organizers—all must think more quickly, work more accurately and be of broader views than their predecessors. But not so the machine tenders; in some cases they need scarcely think at all.

Now there are some 5,000 occupations at which men and women earn their living, such is the complexity of modern life. Of course, not all of these are in any danger of being automatized to the extent that I have mentioned. Some of them never will be. In others, the advance will be very slow; but in all those which are of the most social significance because of the large numbers employed, I think it is self-evident that economic pressure will force the further transfer of skill from man to the machine to lengths which we are scarcely capable of comprehending at the present time.

With these points in view let us observe some of the results and tendencies. Quantity production has lifted the standard of living, but it has not equally lifted the standard of conduct; it has increased wealth enormously, but it has not to the same extent increased human happiness; in fact, I think it is safe to say that the sum total of human happiness, compared to the population, is rather less than it was. I cannot challenge the statement of an eminent British physician who says: "Increasing civilization for the past seventy years or more denoted an enormously increased worry, sorrow, augmented mental and physical friction, most felt by poor and toiling classes; yet in hardly less degree by the ranks above who all do their share even to the highest in energetic labor for the common good; but who are also more sensitive, more apt to give way to brooding sorrow." Dr. Hugh Cabot, the author of that well-known work, "What Men Live By," has recently vouched for the statement that 50 per cent of the world's ailments at the present time are the result of nervous origin.

These quotations perhaps explain why the central problem of industry seems now to be the handling of men, whereas it used to be the handling of materials. The great war, of course, enormously intensified the conflict, but even before the war there was a very marked social indigestion which we call social unrest. I remember seeing a play called "The Bronze Woman" in which a well-fed dowager said, "What is all this talk of social unrest? If the laboring classes want more rest, why don't they take it?" Well, in some quarters they are taking it, and I, for one have no objection to their doing it anywhere, providing they keep life's finer values intact in the process. But that is something that an uneducated proletariat never can do; consequently my interest in education for leisure.

This pessimism over machine civilization is spreading. I have just been reading a remarkable work, "Social Decay and Regeneration." This author seems to have been everywhere and done everything. His analysis is a very remarkable piece of work. In the last quarter of his book, his regeneration seems to be degeneration, because he is not able to say much beyond that we must get back to craftsmanship. That does not seem to me to be at all possible. I think all of us get pessimistic at times. Sometimes it looks as if the human race needs another flood, providing there is no ark handy. Yet social controls have not been exhausted by any means, and the depths of individual altruism have not yet been plumbed; so we must pick up and carry on the best we can. We must play the thing through to the end of the string.

What is the inside meaning of all this industrial turmoil? Of course we say, in a general way, it is the changed attitude of labor. Physically man looks about as he did when he first stepped into history. He wears a few more clothes, but he has the same number of hands, fingers and toes. He loses his hair a little earlier, but that does not matter very much. However, something important has happened to him in these years. Twenty years ago I knew an old lumberjack who absolutely refused to work for more than $14.00 a month. He said he had had experience with men who had tried to pay him more than that, and he had come to the conclusion that anybody who offered to pay more than $14.00 a month meant to beat him out of the whole $14.00; $14.00 was his price and that was all he would take. Now we have got to this change of attitude; labor has ceased, to come extent, being obedient. The importance of this change is enormous; the poet says:

Three roots bear up Dominion: Knowledge, Will,—
These twain are strong, but stronger yet the third,—
Obedience,—'tis the great tap-root that still,
Knit round the rock of Duty, is not stirred,
Though Heaven-loosed tempests spend their utmost skill.

We have the knowledge and the will, but not having obedience, we have serious industrial unrest. Since the war, of course, labor has become more truculent. The old demand of labor used to run something like this: "Give us a better deal, because we deserve it and you ought to give it to us." That was a plea, but now it seems to have come down to a demand. Labor says, "Capital is not running the world kindly and comfortably; capital has played the gambler with wealth instead of the steward; it has made a great war without honor and a great peace without joy, and under this code man is degenerating physically, morally and spiritually." Capital itself is uncomfortable because the state is getting on top of industry. Everyone is fretting about income taxes and other taxes. "Liberty is being driven into a corner," labor says, "for a finish fight; you have tried your hand, now give us a chance." So the future of automatization seems to me to be limited, not so much by the ability of our selected men and leaders to mechanize the plant as by our seeming inability to make the job worth while, under that system, to common folk.

Economic man is an abstraction, he does not exist anywhere. Man is not only economic, he is also social, political and religious. He has many governors, among whom the state is sovereign and the shop parvenu. It is only 150 years since steam was applied to production; that is only six generations out of the recorded historical line of many hundreds of generations. Moreover each individual is distinct from every other individual. You can put a shop number on a man, but nevertheless he is different from the one below him in numerical rank and from the one above him. No two individuals are alike; in one sense, life is a struggle of one individual to impress his uniqueness upon his environment. When this composite man comes to the machine, he is pretty apt to find that the machine calls for only a fraction of his powers. The shop can never find in the labor market exactly what it wants. It may want mere hands or feet or limbs; but, as a matter of fact, it has to take the individual with all his superstitions and lusts and faiths, as well as blind passions and the political traditions in which he has been brought up. Consequently, labor always brings into the mill that which may result in an appeal to anarchy or force, the appeal to Demos or to Caesar.

This mental luggage is various categoried by the psychologist. But for convenience let us say that it consists of those instincts, emotions, beliefs, habits of thought and conduct which, in their interplay, establish individuality in the conduct of the individual, in his reaction to authority and social responsibility. These mental qualities root back to the dawn of life. They are the fruit of recent experience, and that is why we say that the common man has common sense; because he has back of him all this vast experience coming down all through the ages. We, of course, are quite a potent generation, and our press agents say that we are doing more for man than any preceding generation; but the chances are that we will add very little to the sub-conscious mind, that reservoir of human experience which is so deep and vast. There, in that sub-conscious mind, can be found the realities of our institutions. As the psychologists says, to explain anything in human conduct we must go back to the instincts. There is the explanation of our greeds and wars and sins as well as our loyalty, faiths and ideals.

This heavy-laden ego brings to the machine a lot of superfluous mental luggage. The man takes off his coat in the ante-room of the shop and leaves it there, but he cannot do that with these subconscious ideas and instincts of his. Thus we find that there is set up in the shop a labor strain which can be differentiated to some extent from the ordinary labor pain recognized by the economist, pain that can be compensated for in wages, or other direct offsets. But these work-instincts which find no outlet in mechanized toil die hard and painfully. Just as a man's arm would pain if it were tied to his side all the time; so I think that when the instincts toward differentiation are balked, when a man has not a chance to express himself very fully in his labor, there is set up in his mind a strain which multiplies many times over, and gradually works down, as everything does in democracy, to a social and political battle. The torment starts with the individual and spreads to the group, and finally comes to worry the parliaments of the world.

At its root this difficulty seems to be that of adjusting human beings to modern industry. We can resist muscle fatigue, because, through all the ages we have been building up a resistence to it; but it was not until quite recently—at the most, less than six generations ago—that man ceased to live the slow life of soil and water in which his movements were regulated by the seasons and the sun, rather than by the calendar and the clock. That, too, was a life of simplicity, of hard manual toil, of greater security in toil than we know at present, because it was under the feudal regime through many centuries. A man could not quit his job because he was tied to the land, but, on the other hand, the job could not quit him; the bond held both ways between the master and the man. So it seems to me that the ideal job for a man, considering his heredity and the sort of life that his ancestors led before him, is one that provides a variety of minors inside the major frame of monotony. The common man is never highly adaptable; shifting rapidly from one sort of work to another fatigues him; he does not register promptly and properly amid too great change; but inside his job he likes a chance to express himself in variety That is probably because his old life was a constant succession of thrills. When he left his lair in the morning, he did not know whether he would ever return again or not. His agility and sprightliness all served him in good stead. If he failed in his spring, if he failed in his leap, he might be left there for dead. That is probably the reason why a man can run a hundred yards at his fastest pace, and after that is a slow animal. Then there came a time when man tied himself down to agriculture and to the tedious shaping of weapons and tools from stone; the application of manual skill to earth and material. At that point the ability to withstand monotony came to have a survival value, but the desire for variety inside that frame of monotony continued. That explains why a carpenter would rather build a stair in your house than paint his own house. That zest for variety is merely the individual's desire to project his uniqueness upon his environment. Improvement in man's estate followed. Simple tools, now standardized, once measured man's individuality, just as your more outstanding contributions to your science measure your ability and individuality. This instinct for variation must have play, or progress ceases. Civilization proceeds by trial and error in work, and not by the conscious plans of statesmen.

Monotony in life, of course, is the price that men pay for living together in groups in order and security, but it intensifies labor-strain tremendously, I think; and, unless relief comes in the minutuæ of the job, men are pretty apt to find the social order oppressive. Emotional repression imposed through modern toil is responsible for many industrial flare-ups. That, at least is the testimony of Mr. Muehlenbach, of Hart, Schafner & Marx, whom I heard talk on that subject a while ago. That blind resentment, of course, will continue no matter who owns the machines. It is a great question with the psychologist and the biologist how long the innovating tendencies may be repressed without dulling the human mind. The carpenter year in and year out on the job, for instance, is pretty apt to emerge more clumsy in other craft efforts. He may be able to lay the floors faster than before, but he cannot build the stairs and the roof as fast; and he becomes, consequently, somewhat less adapted to the ordinary all-around work of the community and perhaps less useful as a citizen.

Hoover seems to think a little about everything, and he expressed himself as follows on the devolution of the individual in the large scale machine process industry. He says, "The vast repetitive processes are dulling the human mind." And again: "We must take into account tendencies of our present repetitive industries to eliminate the creative instinct in their workers, to narrow their fields of craftsmanship, to disregard the contributions which could be had from their minds as well as their hands. Indeed, if we are to secure the development of our people, we cannot permit the dulling of these sensibilities." The scope of that dulling, if the minute division of labor and automatic processes work out that way, is unequalled in extent. I do not think that there ever has been any organization of society which has presented that dulling feature to the extent ours does at present. You see, industrial efficiency calls for close concentration upon the unvarying task, for rigid control of work environment, for the elimination of excitement and thrills, for the subordination of personalities; and the obvious result of all this is to reduce the common man eventually to an automaton.

Now who is this common man? The Army intelligence tests showed that he has a mental age of thirteen to fifteen years; is fairly adaptable, loyal, conservative; accepting leadership, he shakes down into a plodding citizen after the first flush of youth is over; more prone to become excited over little things than to give thought to big things, he is nevertheless, in the last analysis, the common sense of the world; without him as a brake, we people of imagination would run away with ourselves. The poet Lowell has this to say on the subject of people of this sort and their conservative influence on social development:

What countless years and wealth of brain were spent
To bring us hither from our caves and huts,
And trace through pathless wilds the deep-worn ruts
Of faith and habit, by whose deep indent
Prudence may guide if genius be not lent?
Genius, not always happy when it shuts
Its ears against the plodder's ifs and buts,
Hoping in one rash leap to snatch the event.
The coursers of the sun, whose hoofs of flame
Consume morn's misty threshold, are exact
As bankers' clerks, and all this star-poised frame
One swerve allowed, were with convulsion racked;
This world were doomed, should Dullness fail—to tame
Wit's feathered heels in the stern stocks of fact.

That seems to be quite significant. Now I have here a little human document. This was written to me by an I. W. W. from Los Angeles and gives one man's reaction to the monotony of modern industry. This fellow addresses his letter "Dear Reverend":

Dec. 16, '21.

Dear Rev.:

I tore this article of yours out of the Los Angeles record simply to let you know your theory is the only real truth I've read for some time.

I am too like a lion in a cage and monotony drives me mad.

That is what has made a wanderer out of me.

My habits are good and so are my desires and ambition, but I have a craving for something new.

I started bumming when I was 16 and have had 6 years of hard grind.

I don't want to wander, but I grow staled in one place and unhappy, my imagination gets ahead of what I can really do. And I am only one of the 10,000,000 drifters from 1 place to the other. I am dissatisfied with a common place job and yet I am filled for nough.

I am one of the fastest riding hoboes on a railroad train, but I feel myself slipping on the wrough train.

My machine has got automotic on the wrough road.

And how you going to stop it? Some time when your mind is not working a double shift on anything write a line if it will help things.

I am with you for the best of luck for the coming year.

No doubt you think I have painted a bleak picture in black and white, but let us tone it down all we can. At the machine a man must stew in his own juice. If his life is a happy life, if his children are well and strong and his wife does not treat him like this wife—you know there is a sort of a defense reaction now among wives. In *Life* the other day there was a picture of a wife lolling on a sofa when her husband came in from work. The husband said, "Well, is there any reason why we should not go out tonight?" The wife said, "No, not unless you want to stay in." Well, when a man's home life is not at all like that, when he is happy, he can get on very nicely on a machine; he can think things over with a mind more or less at rest; he is all at peace with the world; he can plan his holiday, think about his children and how well they are getting on in school and picture his little garden. While attending to his machine, he has short vacations from consciously directed thinking. But, on the other hand, if he is torn by fear and worry, if he feels himself the butt of titanic forces beyond his control, it seems to me self-evident that he is going to lead a sour and anti-social existence, particularly if he has no hobby, no avocation, nothing which lets him express his personality after his machine has stopped running.

That is why I have given a good deal of attention to this matter of education for leisure. It seems to me that our schools need to teach the things that the shop cannot teach. The shop can teach concentration and direction of effort, but it cannot teach delight in life, nor can it infuse men with the spirit of truth nor show people very well how to spend their leisure time ethically and profitably. The public schools for years have been teaching the philosophy of success to people who, by no stretch of the imagination, can possibly become eminent in wealth or position. Men who test thirteen years by the Binet scale can never become successful men; they are always in the led majority—they need leaders. Yet men of that stamp have been told, for twenty years at least, that they must succeed. And having failed, the conviction of failure is on them—what the psychologists call a failure complex oppresses millions in our society. I dare say there are millions of people in this country who have lived as well and as fully as they could, who have paid their debts and reared families, and who certainly deserve something better than the Scottish verdict on their lives. So, I say, it is time for the public schools to quit teaching the philosophy of success, and let them try to make a success of philosophy.

Of course all over this country, in the shops of the character I have been describing, efforts are being made by the employers to shift this burden of mental distress. Something has been done very successfully out at Washington, Pa., on jobs, and something more is being done right along by fitting men to jobs for which they are mentally adapted. A good deal is going to be done, I feel sure, in making jobs interesting by showing the workers the whole process and by bracing up non-financial incentives as described in Mr. Robert Wolf's paper—a very able paper, as all of you know. Then, too, the team-play spirit can be roused through cooperation, and the possessive interest can also be aroused through such things as ownership of shares.

One of the things which most distresses industrial labor, I fancy, is its relative insecurity. The automatic machine and the whole process of transferring skill from the man to the machine has had a tendency to widen the circle of competition for each job. For instance, in our factories in Flint, a farm boy can make himself useful in the production cycle in from three to ten days' drilling. The result is that with respect to many of those jobs in our factories, the men on the job can go without the boss feeling any great distress about it; the men have only a slight hold on their jobs. Their insecurity has been increasing. And of course, when the job becomes insecure then the home becomes insecure, and you at once arouse a defense reaction in that man's mind.

We all know the application of psychology to work is very old indeed, but lately it has been done more scientifically. The good employment agent has always been a rough and ready psychologist, and the good foreman has always done his work with some insight into human nature. Of late a vast new body of knowledge has been developed under the head of psychology, with branches in sociology, psychiatry and psychoanalysis, and the laws of mentality have been worked out to such an extent that physicians are using them successfully in combating this 50 per cent of disease flowing from nervous origin. These sciences are being applied very zealously in many plants. A good many of you have read Mr. Boyd Fisher's paper recently, issued from Boston, in which he comes out flatfootedly for our acceptance of the doctrine of limited accountability for help. He says quite frankly that the majority must be led, and the only thing to do with them is to find out what they can do and then see that they do it, taking good care of them meanwhile. And perhaps some of you have read also of the work done by Miss Elizabeth Bigelow in the United States Rubber Company, appearing in Mental Hygiene for April of last year. Miss Bigelow took, I think, eighteen subnormal girls and after a period of training, rather intensive training, she put them to work in the plant of the United States Rubber Company, and there they functioned very well indeed. They were able to do some jobs even better than strictly normal people who lacked Miss Bigelow's training. None of these girls had ever been able to earn a living before. Many had tried housework and failed; they had tried storework and factory work; but trained, watched and supervised, they did their factory work very well indeed.

You see what that means to society in general. These people were morons or below morons; some of them were even imbeciles; yet they could do that sort of work. In Flint, in our factories, we have a good many deaf mutes; they come out of the Michigan School for the Deaf, and their deafness is a positive advantage in certain kinds of work, because our automobile factories are very noisy; indeed, many factory workers seem to grow protectively deaf, many of them have to put cotton in their ears, anyway. In such cases something less than a whole human being works and functions successfully in society. There is always the possibility that, when low mental types come into industry, those less than whole human beings will drive higher types out of the jobs because they can work more cheaply; their standard of living is not as high and they are more docile. I have not any set program for remedying this condition. A good many far abler men than myself, specialists, are at work on it, and after all it is to specialists we must look for definite progress.

For several months I have been dodging programs. I have no faith in any uniform program working out for this great country of ours with its widely diversified interests and its great variety of peoples. I think that in general the thing will be done by employers and their agents on the job, each man in his own field dealing with his own work people. Communities differ, plans differ, personalities differ.

I say I have been trying to dodge programs. It is really pitiable, friends—you would never believe what strenuous efforts are made by some people to tie you up to their programs! There was a lady from Wellesley College who came clear up to Flint and said to me, "Now you say we must educate for leisure; shall we teach a little more history in the eighth grade and a little less mathematics?" She put a great responsibility on me. She said she had a year's leave of absence next year, and would I please tell her what piece of research to do so that she could spend the year productively. That is the sort of thing I have been getting since the *Atlantic Monthly* articles came out. An excellent fellow came from the National Community Service School, Chicago. He wanted to go over his entire curriculum with me. In Boston, at the time of the railroad strike, a man said to me—he was the editor of a magazine—"What do you think about the railroad strike?" "Fine, it's a good thing it is coming off now rather than later; I am going home and help move freight." "Why," he said, "You are a hell of a radical." I said, "I live in a community where they know I am just as radical as a plug hat." So that is the way I stalled him off. All these people say, "Well, if you haven't got any program, why don't you take our program?"

That is simple and easy, too. I think in about two years I am going to take five years off and retire to a farm and write down a nice program; and it is going to be a perfectly safe program, because while I am on the farm the world will move so fast that nobody will look at the program a second time. No, I cannot follow sled-length any program I've ever seen.

Well, friends, I am nearly through; I can say, like Lady Godiva as she rode through the streets of Coventry Town, "I am drawing near my *close!*" I do not mind telling you people in strict confidence that this country is in a pretty serious way. You know they say it is a fine thing that we are the world's creditor nation. I have looked up the history of the world's creditor nations and I find that they have not lasted very long after they became the world's creditor nations—only a few centuries. All the way from China clear around through Greece, Persia, Rome, France and Spain, and through thousands of years, one can draw from history this lesson; that a creditor nation is in danger. Why? Do you know what a creditor nation is? It is a nation that gets something for nothing, something it no longer works for. All this stuff we have got of late, this gold and credit and so forth, seems to me to be loot; we took it away from Europe when Europe was in great need. We did not even go over there and drag it away, as the Vikings did of old; yet now we are getting their Blue Boys and interest checks. Of course we buy them, but after all they did not cost us very much. In olden times the boys went out to fight for loot; our loot came less violently but more easily.

In reading history one is impressed with the fact that many ills begin to beset creditor nations as soon as they have established that proud preeminence. One thing is, that the leaders begin to grow soft; the governing classes forget how to govern; from amateurs they become bleacherites; from people who provide their own amusement they become the patrons of commercialized amusements. That seems to me to be our situation. The common man has been kept sound physically all through the ages because he was hard at work out in the fields; the men of the governing class might become enervated, weak, immoral and base, and betray the state and so on, but the common man went on growing his wheat and plowing his fields and kept himself hard and strong. But now, to a greater extent than ever before, our common man works indoors on jobs that might be called sedentary. We think of the sedentary man as the office man, but really a good many factory jobs are just as sedentary as office work. I wonder if it means anything to you that the life expectancy of the farmer is fifty-eight years and that of the office clerk is thirty-seven years. All you men are nearer to the office clerk's manner of life than to the farmer's way of life.

In other words, this automatic machine production has placed our present generation under very severe physical, mental and moral strains. I do not know how the issue is going to be met; but I am quite sure that, unless it is met, we might as well stuff the American eagle and put it into a museum along with the Roman eagle, the Russian eagle, and the German eagle. Republican America will then be one with Republican Rome, with Nineveh and Tyre; a glory that has faded, a vision gone astray, a story, a history, a mystery, a marvel that such could have been and having been, could vanish so completely. But then it need not be so if we have the brains and the courage to meet these issues as they crowd forward; meet them bravely and win. We have the science, have we the heart and courage? And if we win, what then? Well, then I think we will fulfill the prophecy of Gutfrieda. Gutfrieda was on the ship of Lief the Lucky when he sighted America long years before its discovery by Columbus. Standing in the bow of that little ship, and looking at the dim shoreline of these states, she made this prophecy:

Looms there the New Land;
Locked in the shadow
Long the gods shut it,
Niggards of newness
They, the o'er-old.

Dark hair and fair hair,
Red blood and blue blood,
There shall be mingled;
Force of the ferment
Makes the New Man.

They shall make over
Creed, law, and custom;
Driving-men, doughty
Builders of empire,
Builders of men.

Here shall a realm rise
Mighty of manhood;
Justice and Mercy
Here set a stronghold
Safe without spear.

Weak was the Old World,
Wearily war-fenced;
Out of its ashes,
Strong as the morning,
Springeth the New.

Beauty of promise,
Promise of beauty,
Safe in the silence
Sleep thou, till cometh
Light to thy lids!

DISCUSSION

Richard A. Feiss[1]: My reactions to Mr. Pound's address are rather mixed. It is the most cheerful pessimism I have heard in a long time. My criticisms concern the premises upon which he bases his conclusions, as well as some of the conclusions themselves. Even if we grant that some of the evils which Mr. Pound points out do exist to the extent and in the form that he implies, I do not see that they are caused by the modern type of industry. In some instances I cannot see that they are caused by industry at all. The connection between many of the so-called evils of industry and industry itself has not been satisfactorily proven. For example, Mr. Pound speaks of the question of human happiness, and he infers that there is a decrease in human happiness. This is a matter in which we are all interested and would constitute a very serious condition of affairs if true. Leaving out the direct result from such catastrophes as the Great War, I wish to controvert any such conclusion.

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[1] Joseph & Feiss Company, Cleveland; President of the Taylor Society.

It never has been proven that there is any decrease in the sum total of human happiness and I believe, using the same premises from which such conclusions are generally deducted, it can be proven that there is a progressive increase in the sum total of human happiness. It seems to me in my brief experience of life that I can see distinct progress in that direction. I might even add that the greater order, greater control and greater command of things made possible by modern organization of industry have contributed materially to this end.

We hear so much about those "good old times" when a man turned out an entire product by his own handiwork, so much of the joy of living and the happiness of those times because of the lack of industrial and economic development, that the subject needs some investigation and I believe some controversion also. One needs only to make a study of the industrial and social life of those times to see how ridiculous is the picture that is often painted. The literature of the times is filled with a picture of general human want. One who believes that initiative and the so-called creative instinct were dominant factors and had full play, will find little indeed to support his contention. A large part of the community—far larger than exists today—was destitute, and a very large part of the remainder was occupied almost entirely in maintaining a bare existence. Not only artisans but also artists were apprenticed and carried on their handicrafts on the merest pittance, usually being dependent upon the subsidy of some patron interested more in self-glorification than in the arts and crafts. An apprentice instead of starting his career with sufficient remuneration to keep him in comfort and having his apprenticeship cut down to a few months, bound himself body and soul to a master for a period of from three to five years, or more. Only a portion of his time was spent in learning his trade. During all of this time he was held to all kinds of drudgery and hard work without any remuneration other than his bare living. Yes, in those "good old days," years of slavery during the best time of one's life were considered essential to "human happiness." To have a true picture one must not stop with the apprentice; one must go on to the craftsman in order fully to realize that the only method of teaching was that of imitation. The opportunity for innovation and self-expression was far less than it is today, and I assume from the long-drawn-out hours and general hard conditions of work that the desire was still less. Is it not foolish to speak of initiative and the creative instinct as dominant in the lives of men at a time when science was considered sorcery and advanced thinkers were burned at the stake?

There is another point brought up by Mr. Pound that I wish to touch upon—the fact that the average citizen is an average man as far as his intelligence is concerned, and that his intelligence is not on as high a plane as we generally think it is. I believe he brings this matter up in connection with the question of automaticity, which is the matter I wish to get at. But first I wish to say we need not be pessimistic about human intelligence. When it is mentioned that the army tests showed an average classification of from thirteen to fourteen years, I will say that this is not a bad grade when one understands the meaning of this grade as established by psychologists. For this purpose one must not confuse intelligence with education and knowledge gained by experience. It refers merely to an inherent mental capacity, and the grade is considered a fairly high one. But, when it is assumed that a man of average intelligence has instincts for variation or when one assumes that the average human mind opposes repetition and the so-called monotony in activities, it is then one assumes wrongly. We have heard so much bunk on this subject in the last few years that I feel that it is about time someone made it his business to tell the truth. Before we are told by half-informed writers about a predominating desire for variety, I think they should first prove that there is such a desire. I defy them to do this. However, I do not wish to make the same mistake of generalization. I will state that psychology does teach us that the desire for variety exists in a very subordinate degree in many people and more prominently in a few people. On the other hand, if there is one predominating desire common to the human mind in general, it is love of mental comfort and the desire to control our acts along accustomed and consequently repetitive lines. It does not make any difference what grade of intelligence one has or in what state of civilization any group may be. The desire for repetition in action and the desire for thinking along habit paths is one of the most important and universal traits of human beings. If this were not so and if we were not constantly being taught more and more acts that become automatic in their performance ("monotonous" the psychologist would call it), human progress would be stopped. Any one of us can think of dozens of things that we do as daily routine which require mental effort and time to learn to do in other than the accustomed way. One need only make a change in one of these in order to have a practical test of the importance of repetitive action, not only in regard to one's comfort but also in regard to one's efficiency. In 1913 Professor Hugo Münsterberg in *Psychology and Industrial Efficiency,* gave a clear exposition of this question of monotony. The subject then, of course, was not a new one. It is only the conclusions drawn from premises contrary to facts that are new.

Mr. Pound speaks of the insecurity of the employee in modern industry. Here again I might say that it is not *modern* industry that brings about this insecurity, although we must acknowledge that it does exist, and I am glad to have Mr. Pound call it to our attention. This is a matter that must be remedied by industry, but I do not believe it has any direct connection with the introduction of automatic machinery.

Speaking of automatic machinery, I wish further to state that many problems are discussed from the point of view that all processing is bound to become entirely automatic. This I think is the wrong view. This deduction is probably made for the purpose of proving that automatic machinery is replacing the skilled worker with the unskilled worker. This is not true in the sociological sense. The introduction of automatic machinery has not decreased, it has increased the percentage of skilled workmen. It is true, with slight exception, that it formerly took a skilled workman to do the entire process in any unit of production. This meant that it took a long time to learn all the processes involved—although many of them were unskilled processes—and also that it took a long time for the production of any unit. The result was not that there were more skilled workmen but that there were less units of production. Modern industry does not confine the craftsmanship of the skilled worker to a small aristocracy in well established lines of descent. It has thrown the doors open to all men of ability to raise themselves up to become highly skilled craftsmen. It is true that it employs more unskilled workers, but these are not drawn from the former skilled class. On the contrary, they are drawn from the former pauper and economically non-usable class. The age of automatic machinery has called for a vast number of designers, draftsmen and builders of machines the use of which demands organizations involving many times the number of executives, supervisors, teachers and so-called "brain workers." So here again we must avoid a fallacious premise.

Mr. Pound has laid stress upon one important thing—the necessity of education for leisure. In this we must agree with him most heartily. While industry must not shirk its share of responsibility, this is a problem not only for industry but for the entire community. There is, however, another important answer to many of the problems which Mr. Pound brings to our attention. While it is true that a man must be educated for leisure, he must also be educated for industry, and this, I believe, is a problem of industry. Scientific management presupposes that the activities in industry as well as the activities in other phases of life must be made educational in order to serve their purpose. *Scientific management makes an industrial organization primarily an educational organization and makes education one of the chief responsibilities of management.* It not only studies each job from the point of view of best methods for its performance, but also with respect to its relationship in the scheme of things as a whole. This involves a high degree of skill on each job, which in turn involves a high degree of training not only as to the performance itself but also as to the proper relation of the job to the general scheme. It becomes important that each job be conducted in a progressive and intelligent manner. This calls into play not only the intelligence of the workman but also establishes a philosophy in relation to his work which is essential to his real development and happiness. As Frederick W. Taylor said, "It sets every man up in business." When men become the mere servants of machinery, when management and men alike are mere adjuncts to machines, not because of the automaticity of machines, but because of the lack of understanding, vision and efficiency in our managers and other leaders, then we have the "Iron Man" as our master. But when machinery and methods and the efforts of men are put to work by intelligent leadership, with a view only to serve the purpose of the men that work with them and those who consume their products, then the 'Iron Man" works for us and we need not be afraid of him.

WHITING WILLIAMS:[1] I remember hearing a joke-smith in Cleveland say that he did not know anything about the subject, but judging from people who had at various times appeared on the club program, that did not prevent him from joining the discussion. I was not able to arrive in time to hear the paper tonight, so I ought not to speak upon it. But I do not feel that it represents a real problem. I feel also, however, that for the most part, we are on the wrong track if we try to accept the job as it is and then try to make up for deficiencies in the worker's leisure hours The place to meet the situation is where it exists, there on the job.

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[1] Investigator, author and lecturer, Cleveland.

I agree with Mr. Feiss that the situation does not exist to anything like the extent that the average outsider thinks it exists on the job. In the second place, in so far as it does exist, it can be lessened a great deal if we will try to approach the problem as if we ourselves were going to be on that job. In our own experience we know that nobody gets anywhere with us by coming to us and saying, "Bill, you have an awful job, I know you abhor your job, and therefore you will of course wish to lessen your hours on it and then have more fun in your leisure."

Nobody is going to get anywhere with you and me by that sort of talk, because you and I are having the time of our lives on our jobs. For the most part, we are thinking the day not long enough for us to do our work; that is because we see into it and find in it such large possibilities for service, such large values of all sorts extending out of it. I believe it will be immensely easier for us to approach the problem of monotony for the workers in that manner than we have any idea of, just because I am perfectly certain of this: that the working man on any job, whether it is shoveling coal, tending a machine or running a locomotive, is lying awake nights trying to see more of the spiritual value in that job than he has as yet seen—trying to get more of its fine points. His great complaint against you and me is that we are so blind that we cannot see the values, the fine points, the satisfactions that he sees so plainly in his job.

I have been telling about the locomotive fireman. One night when I got up there by him on his seat, the first thing he said to me was: "The engineer over there is a blamed important looking fellow. He thinks he is running the whole show with his hand on the throttle. But, take it from me, he would not get very far if he didn't get his power *from me!*"

I said to myself, "He of course simply imagines those fine points of his job. There cannot be any in the art of throwing coal into a fire." Then he asked me to take a chance at it. So he showed me how. I tried to keep the fire-door closed up until the last minute, while getting my shovel full. Then I would open it and close it quickly after delivering the coal—with one foot on the engine and the other on the tender, the train going seventy miles an hour and the engineer calling "Mind you keep yourself loose-like above the waist up, so you don't fall out!" Just as I thought to myself, "I have got this thing down pretty well—this trick of putting coal in the fire," he said, "That's very well, but take a look up here at the steam gauge. Buddy, I'm awfully sorry but we had 180 pounds of steam to start with and have only 150 now! If you keep on putting in coal in *that way,* we'll soon come to a dead stop. Here, let me show you!"

He got down and with the shovel for a visor looked into the fire: "Oh yes, over there is a black hole that needs more coal—over here another. Very well!" Then he gave the shovel a twist of the wrist and shot the coal over into the right place. Then he shot the coal over into the other place with "reverse English" on his wrist. Then he hit the shovel at the edge on the lip of the fire opening, so that it sprayed the coal over the top of the fire. Then the black smoke came out above the cab as if to say, "Thank you, that's enough," and the steam gauge showed its appreciation.

Then he said: "You see an engine is all fired temperamental; it has got to have coal *when* it wants it and *where* it wants it exact. Now these people who are dealing with human beings are awfully stuck on themselves. Huh! you can put anything over on human beings, but believe me, you have got to go some to put anything over on a fire."

Now I could talk until six in the morning, telling stories of that kind, showing how working men are just praying that the rest of us shall see the fine points of their wonderful jobs. We think the shoveller has no respect for himself because he is just working with a shovel, but one of the best engineers in the country tells how he says, "Mike, bring me a shovel, I want you to do a job." If Mike goes and picks up a shovel like this—taking the first one he sees—he says, "Mike you won't do!" But if Mike picks up a shovel like this—lifts it, and puts it down and then takes up another, finds it is all right, and says, "Yes sir, what can I do for you?" Then he knows that Mike has the shovel that is just right and is a real shovel artist. The only fight I ever saw among common laborers was over a shovel. The shovel belonged to the company. Men like to feel that they can make themselves effective and show that the world would not run well except as a result of the mastery of some tool.

When we say, "Look at that fellow, he has got nothing to do but mind that tool," he wants us to say instead, "If you had been working without this tool as an old style craftsman you would have gotten in touch with—and served—perhaps a dozen people. Now the thing you are doing with that tool will get you in touch with—help you to serve—a *thousand* people!"

Instead of that we say, "Oh, that's too bad, we will help you out on your off hours." People who try to put themselves so superficially in the place of the other fellow will be as bad as the minister who said, "We realize, O Lord, that on six days we are working at our jobs, earning our living, and of course getting dirty, doing things we do not like and getting our souls soiled; but we thank Thee, O Lord, that we can come here to church on Sunday, and so be purified for another week of unpleasant living and working." Now we try to say much the same thing, when we believe that of course everybody hates his job, but we will give him enjoyable leisure time. Of course we want him to have leisure time, but we have not scratched the surface of taking men as they stand at their work doing these repetitive processes, and filling the minds that want to be filled, and helping them to think better of themselves by understanding what their work is all about. There are too many thousands of men who have never seen the completed machine of which they have been making parts for years. If we can help them to realize what that part is, what it has contributed and the service it has performed all over the world, then we have found the best place and the most normal and wholesome place in the world at which to meet them. That place is there on the job, not in their leisure hours. There on the job is where they live and move and have their being and there is where we should organize ourselves to live and move with them.

ANNA BEZANSON:[1] Mr. Williams said what I wanted to say, and said it very much better; he laid stress upon the amount of skill that is required on minor operations. People who go to the shop with the clerical point of view never really get the spirit of the workman, who knows that skill does not consist of ability to operate a machine, and who never, for a minute, thinks that the operation of a machine is the fundamental thing in connection with skill. He knows perfectly well that a knowledge of the materials of his trade is the fundamental thing. Formerly, in the machine work, when the mechanic got through his apprenticeship, he travelled. What he travelled for was to gather up a knowledge of the trade—a knowledge of chemistry, if he were in the iron industry, and a knowledge also of chemicals if he were in the pottery industry. This knowledge of chemistry and science is open to every apprentice in every one of our shops today, so that what we have forgotten is the very great adjustments formerly necessary to secure information. The man knew something of his materials by reason of his actual knowledge of the machine and the trade. When we say skill is transferred from the man to the machine, it seems to me that we are forgetting the technique of constructing machines. An inventor studies operations and builds a machine to take over the operations requiring the least discretion and the least amount of attention. Obviously what is left must be that part of the operation which is not varied and which requires the greatest amount of adjustment. The operation done by the machine has always been monotonous; if it is monotonous now, it has always been so, and has not been made monotonous by being machined. There has been added the knowledge of operation, promptitude in attending, and the adjustment to meet new situations. Those who know far more of industry than I do, know how difficult it is to get any product so standardized that there are no new problems to face, no weather conditions to be met, and nothing that the worker himself cannot take care of in looking after his machine. It is difficult to make any work foolproof. Only a person who knows the shop can appreciate how many new situations arise even on simple work. We have never done full justice to the actual amount of skill which the tending of machines and the performing of minor operations requires. It is often said that such jobs can be learned in a short time, yet everyone knows that a department of people of such short experience would be impossible to supervise. The silk man goes to the shop with a realization of the knowledge of the materials in his trade, acquired by working in many plants. The same is true in cotton and metal work. I submit that the subtle ability to control materials is the important thing gained in the shop in anticipating working problems, and that in so-called automatic work, more is involved than the mere tending of machines.

YOICHI UYENO:[1] The problem of monotony is an important topic in industrial psychology. Even from the humanistic point of view, the dulling effect of industry on the workers, if there is any, must be studied thoroughly. But I believe there is another point of view than that of Mr. Pound.

When I was in Cincinnati, I had the chance to visit the plant of Proctor & Gamble, and was speaking about the problem of monotony with Mr. Zoeller who is in charge of employment management. He said that he could not stand such monotonous work as putting the top on every Crisco can which is brought by the conveyor incessantly year in and year out. So I asked him whether he would not consider it monotonous to go back and forth from home to office, repeating the same thing every day. His answer was that he found so much variety in his work that he was not tired of his work.

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[1] University of Pennsylvania, Philadelphia.

[1] Chief Director, Institute of Industrial Psychology, Tokyo, Japan.

In my opinion, such matters as monotony and variety do not belong to the work itself. No matter how full of variety and of interest the work appears to be, one might not find any variety and consider it as monotonous as putting tops on Crisco cans. At the same time, even in apparently monotonous work, we can find some kind of variety through our mental attitude. Therefore the problem of monotony and variety does not exist in the outside, but rather consists in our inner life, that is in our mental attitude.

To seek the strong foundation of our lives in the inside, but not in outside, has been the fundamental idea of our Oriental philosophy. More than two thousand years ago, Confucius, a Chinese philosopher, left a famous saying. According to his idea, even though we have nothing to drink but a cup of water and are lying down, we must be able to find our enjoyment in it. This means that we should not look for genuine enjoyment outside, such as eating nice food or wearing beautiful clothes or something like that; rather we should be happy even when we are oppressed with poverty. Dharma, an Indian philosopher, sat in his room nine years just facing the wall while working out his philosophy. One would suppose his situation to be very monotonous, but I believe he was very happy and busy during those years.

Since I came to this country, I have noticed that the Americans are laying too much stress on the distinction between work and play, and between business and enjoyment. The Oriental idea, however, is to find enjoyment in work itself, and this is possible only through our peculiar mental attitude. As long as we are seeking enjoyment not in the inner life, but in the external world, we shall never be able to get peace of mind and will remain slaves to our endless desires.

I feel that Dr. Taylor was capable of grasping some of these Oriental ideas. When he was invited to the Congress by the Committee of the Investigation of Taylor Shop Management, to explain his system, he said that his fundamental principle did not consist of such devices as stop-watches, control-boards, routing and planning, but rather of the change in the mental attitude of both employers and employees. Science can be compared to the rifle, and the personality, from which our mental attitude can be seen, to the artilleries in the background. Unsupported by such a background, rifles, however large in number, will be of no avail. I think the solution of the problem of monotony must be from this viewpoint.

If Dr. Taylor were here this evening, he would certainly be interested in the Oriental idea of the right way of living, and would start to study Oriental philosophy to supplement his wonderful idea of scientific management. At the same time, I believe that you men engaged in scientific management will be open-hearted enough to adopt some of the Oriental ideas, just as the ladies of this country, who are so anxious to be up-to-date in dress, seem to be pleased to adopt the Japanese Kimono sleeves as the latest fashion.

C. Moffitt Ford:[1] I am reminded tonight of the old saying that the longest way around is the sweetest way home. The longest way and the way around may be the sweetest way, but the trouble with that way is it doesn't always get you home. I think we have been going a long way around tonight, and I do not think we have got anywhere in particular. In the entire evening's discussion we have not agreed on what the problem under consideration is, or even if the problem really exists. I think it is time that we bring the scientist's attitude to bear and definitely determine just what the problem is as the very first step toward its solution.

I notice on the program of announcement that the evening's address will take the point of view that, according to Herbert Hoover, the vast repetitive processes of modern industry are dulling the human mind. Now I would like to point out that while the address did take that point of view—in a general way—just what kind of repetitive processes, just what kind of automatic operations, are considered responsible, were not specifically stated, and the general discussion of the subject was even less specific. For instance, the substance of Mr. Feiss' reply was that mankind is happier today and the lot of industrial workers better, than in former years. I believe it, but that is not the question. The question is, in the first place, is it a fact that in modern industry there are processes, mechanisms, machines that are dulling the average workman's intellect? If so, what are these agencies? Are they repetitive processes or merely certain kinds of repetitive processes? Are they automatic machines or only certain *kinds* of automatic machines? If only certain kinds of processes or machinery, then *what* kinds? We shall never get anywhere on that problem until we isolate it from the interesting but foreign considerations that have occupied the discussion tonight, until we, in the first place, agree on the question of fact: are there or are there not, in modern industry, processes which are tending to dull the human perception and intellect? If we agree that there are not, then our consideration of the problem does not need to go farther. If we agree that there are, then I think we should isolate, in our own minds, the question of what they are.

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[1] Pittsfield, Mass.

To illustrate very briefly the fact that some repetitive mechanical processes, at least, do not tend to produce greater fatigue or dullness than the processes they displace, I need only to refer to the mechanical calculating machine. You all know when a person works eight hours a day at mental addition or calculation, how dull and fatigued he becomes toward night. That same person can take a calculating machine and work eight hours a day and come out at night fresh; consequently that particular mechanical operation is less dulling and fatiguing than the old mental or hand work operation it replaced. On the other hand, it is very possible that there are many repetitive or automatic operations today which do not show that favorable reaction, so I believe that we ought to get our problem right down to this point: first, the question of fact, *are* there in modern industry such processes? second, if so, what are they? Then if we can agree on what they are, we can attack the problem intelligently.

John Bancroft:[1] I have been greatly impressed by Mr. Pound's articles in the *Atlantic Monthly,* which I have read from the beginning of their publication; and I will state to Mr. Pound tonight that I hope he will continue in this campaign and extend his propaganda as much as possible. I think the great danger to industrial management is the feeling among many workers today that they are denied the opportunity for self-expression in connection with their work. I think when you Taylor management engineers design a machine and systematize a routing, the man who is employed even in the most minor capacity will do his work more contentedly and with a greater interest if he is asked to express himself about it, even if he is unable to make any important specific suggestions. If he is the man who is going to operate that machine, he will feel that he has some self-expression in it. I can agree with some of the points that every speaker here tonight has made. I agree with Mr. Feiss that the majority of the workers in almost any industrial plant, if asked for an opinion whether they want the opportunities that Mr. Feiss is endeavoring to give them, will say they are contented where they are. Those who are contented to be there, let them remain; but the man I want to find in my establishment is the man who is not contended to stay there. I want to find the fellow who wants to get ahead, who wants to know more about the job. I want him to provide his successor, if he possibly can. If he can provide a successor that is better on his job than he is, I can provide a better job for him and will be glad to have that opportunity. I think I can safely say that we have not a man in our employment, from manager to foreman, who has not obtained his present position by not being willing to stay put. What Mr. Williams has said I want thoroughly to endorse, because I think that he has the right idea; and I want to say to Mr. Feiss that I do not agree with him that the opportunity of shorter hours and bigger pay produces happiness. Happiness is a state of mind. Bigger pay and shorter hours give an opportunity to indulge in the luxury of prettier things, better living conditions, more expensive houses, more expensive furniture and more expensive clothes; but with my more than fifty years of experience from almost the lowest position a man could occupy in a plant on up through all phases of employment to chief executive, I have found that the happiest man is not necessarily the richest men. Happiness is a state of mind; it is not the money you have in your pocket or the clothes you have on your back.

Sanford E. Thompson:[1] The author of the paper "Mills and Minds" has presented a serious indictment of modern industry which to a certain extent at least cannot be controverted. What has not been brought out in the discussion is the fact that the truly scientific method—or putting it more concretely, the Taylor method—tends to overcome the defects cited to a greater degree than is possible by any other means.

This is a strong statement, but it is true. It is true because the Taylor method helps the worker to do his job in the best way and thus gives him the joy of accomplishment. Yet this is contrary to the general impression, not only of the public but of many manufacturers. The Taylor "system," they say—and I am not speaking from hearsay, but from personal conversation with man after man—is good, it accomplishes a lot, more than appears possible, but it does not strike the human element; it destroys individual initiative. This has become almost a trite expression, and it is perfectly remarkable how sinister and corrupt an influence this is having and what a real set-back it is giving to true progress in industry.

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[1] President Joseph Bancroft & Sons Company, Wilmington, Del.

[1] The Thompson & Lichtner Co., Consulting Engineers in Industrial Management and Construction, Boston, Mass.

We may as well strike right from the shoulder. There are a multitude of so-called industrial engineers today who have not the years of training and experience in analysis and technique to get down to fundamentals, to basic principles in management, who are going around the country knocking the scientific method, sneering at the Taylor principles and fostering this absolutely unjust and false impression for advertising purposes.

But as individuals of the Taylor Society, we are to blame in a large measure, not for these innuendoes of the charlatan, but for the really sincere feeling of the man who has not had the opportunity to study the true facts, to see the difference between the results that can be accomplished by the rule-of-thumb or superficial method and the results of it showing day after day and year after year, through the really scientific development of methods and the elimination of waste in industry.

We have heard in the paper by Mr. Pound a severe criticism of modern industry. That this attack was not aimed at scientific management seemed so evident to those of us who are in the game that none of us got on our feet to show how the principles that this Society stands for—the principle of scientific research to find the best and easiest way, the way that will develop the skill and the ability of the worker and therefore his mind as well as his body—is combatting, and combatting valiantly the effects of the mill and the monotonous grind.

Whiting Williams brought out a vital truth in his illustration of the locomotive fireman shoveling coal with the satisfaction that he was doing it in the best way, in the way that would bring up the steam pressure —in the scientific way. And is not this an accurate illustration of science in industry? The worker selects a standard tool, in this case the shovel, best adapted to his work; he adopts not the rule-of-thumb method, but a standard way of doing it and he trains himself to carry out this method day after day. We have in this the Taylor fundamental principles—but individual initiative! nonsense!—he does not do this by individual initiative, he does it because somebody taught him how to do it—the fireman who gave him his training. Take another first-class fireman, see if he will not do it in substantially the same identical fashion; coal at the right time—just where needed—by the best method of handling the shovel—the scientific method. And he is not a machine because he has to think to do it in just this best way. Does it matter to the fireman whether he was taught to do it in this way by another fireman, or by a man who used to be a fireman, but has become an instructor because of his special skill? Does it matter even if, as in the scientifically managed shop, he gets his training from the typewritten sheet? Friends, the joy of the work is in doing it well and further in having that "well" appreciated! It matters little in principle whether the appreciation is shown by the engineer himself, by the surge and the impulse of power, from the rising steam gauge pressure, or in the good old days by his master patting him on the back, or whether he has a direct or an indirect financial incentive. But he must have some acknowledgement of what he does. This may be determined by records, it may be determined by the sometimes disdained standards of performance to let himself see and to let others see that he is doing a job. A man shoveling coal out of a car cannot see the steam gauge rise, he cannot feel the thrill of the engine as it responds to his shoveling. He must have some other recognition of his work well done. And he can have a standard of performance, he can learn that in order to come within the standard performance he must attack the coal pile in a certain way and that he must handle his shovel in correct fashion—that he must become an expert in his methods and so he can get his joy in his work.

But one's work must receive recognition. How long would you and I do our jobs with joy in accomplishment unless the world, or our individual corner of the world, appreciated that we were doing our work well? For a homely but almost universal illustration, is it not true that the recognition of the wife when her man, as a guarantee of a job well done, brings home a report of his accomplishment for the week together with a big fat pay envelope, is a thing well worth while, although without the constant thrill of the locomotive?

I say then that the following out of the principles of scientific management as taught by Frederick W. Taylor, which helps the worker to find the best way of doing his work—which leads to the joy of accomplishment—is one of the finest things today in modern industry. But also give the man his steam gauge, or the equivalent, to let him see what he is doing. In fact, give him both applause of the wife and the steam gauge.

BUDGET CONTROL[1]

BUDGET CONTROL REQUIRES A DEFINITE ORGANIZATION, DEFINITE ACCOUNTABILITY, AND ACCOUNTS WHICH REFLECT ACCOUNTABILITY

By George E. Frazer[2]

LET us set up three premises as to budget control. In the first place, a business budget presupposes an accountable business organization, in the second place, a business budget presupposes that accounts are maintained so that the organization is held accountable; and in the third place, that the business budget itself is a system of future accounts in terms of organization responsibility. The first phase of budget control that should be discussed is responsible organization. The main difficulty a practitioner has in setting up systems of budget control in business lies in the lack of accountable organization in the business in which he may be engaged. I think, without boring you, that I can remind you that most of the textbooks on business organization content themselves with a discussion of the legal side of organization. We have quite elaborate presentations of the individual form of ownership, of partnership, or corporation control, of syndicates and combination and consolidation. That is not the particular field of organization to which I refer today. We need, indeed, excellent presentments in textbooks of the field of technical business organization.

A business organization, from the standpoint of budget control, may be said to be, first of all, a policy making organization; second, an executive organization, and in the third place, a staff organization that furnishes information through the executives to the policy makers.

There is one specific problem in organization of first importance in budget control. That problem is the separation of policy making from executive powers. In most of our forms of business organization, as applied particularly to corporations, we have a theoretical separation. We have a Board of Directors who are assumed to set the policies. We have generally a President clothed with full executive authority—that is, in theory. In actual practice we find the executive constantly concerning himself with the consideration and formulation of policies, and the Board of Directors constantly concerning itself with minutes and details of executive authority. Now I am not here to make a special pleading that all policy making should be vested in the Board of Directors. The President, alone, may be the policy maker. But if the budget is adopted by the Board of Directors, that fact presupposes that the Board of Dircetors is the policy making authority and that the executives are to carry out the policies as made by the Board of Directors. The contrary is, of course, true in the great majority of American business enterprises. The directorate has the nominal function of the approval of the executive; the adoption of the budget by the Board of Directors is a nominal adoption in the great majority of cases where such an adoption occurs; and the executive fully understands that if, for any reason whatever, he wishes to make any change in the budget, that is, in the policies, he has entire liberty to do so. Hence at that very point there is a lack of clear-cut definition in the budget making. The policies of the corporation as outlined in the budget are adopted nominally by a Board of Directors, but adopted actually by the autocratic action of the President of the company. Where you have that situation, it is to be supposed that the budget will lack the element of business stability, because if the President of the company has autocratic powers in making changes in the budget, the reference of the budget to the Board of Directors is a purely nominal affair.

Another primary problem in organization affecting budget control is the lack of complete executive authority as we find it in American business. As I read the altogether too few literary remains of Mr. Taylor, I find there very strong evidence of a desire for complete executive authority in the hands of one man. We find a great deal in American business literature that would lead us to assume that every American business is dominated by one big man, that we have arrived in this country at an autocratic form of government in business. Perhaps we have arrived at more autocracy than we have at executive authority and responsibility. Most of our executives do not find themselves clothed with complete executive authority; they do not find themselves clothed with complete power to execute, primarily because there are no policies definitely determined and handed to them as the basis for their executive work. A President who regards his Board of Directors merely as a consulting body or a nominal reference body, very naturally is more concerned with policy making than he is with executive work. There are a few corporations where there is a relatively great differentiation between policy making and the execution of policies. You will all of you have in mind the United States Steel Corporation, with its finance committee that makes the policies of the company, presided over by the Chairman of the Board, and with a President of the company to execute those policies. Of course, I do not mean to say that the President of a company should not suggest policies, but there is a vast difference between suggesting policies and actually making them. I do not want to belabor this point, but at the risk of being tedious, I want to make it perfectly clear, because it is the basis of most failures in budget control systems, this lack of differentiation between the policy making body and the executive body, the fact that the President of the company is so completely concerned with policy making and policy changing from hour to hour and from day to day, that he has little or no time to execute policies and therefore delegates their execution to subordinate officials of the company. I am no stickler for titles. I would perfectly agree with a system of organization where the President, with a committee or without a committee, was the policy making authority, and the senior Vice President was the chief executive; but I do suggest, as one fundamental in budget making, that we arrive at a separation of the executive from the policy making bodies in corporations, to the end that this budget, when adopted, may be an expression of policy and may be carried out by an executive who is committed to a permanent and continuing policy in his business until it is changed by the policy making board, committee, or chief.

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[1] A paper presented at a meeting of the Taylor Society, Philadelphia, March 17, 1922.

[2] Frazer & Torbet, Chicago.

My own practice, if it will be of any interest to you, is to recommend a policy making body; that is to say, if I find that the Board of Directors is too unwieldy or too indifferent or too far-spread territorially, or for any other reason is unable or unwilling to assume the function of policy making, I then urge, respectfully and insistently and persistently, that an executive be recognized as the policy maker or that an executive committee be set up that will be at hand and continuously at work, and will take unto itself the function of setting up policies and amending policies so that there may be a distinct separation between policy making and execution.

In the third place, I would call your attention to the need for a positive line of authority. The President should delegate his executive powers to not over five or seven men; they, in turn, should each of them delegate their powers to a few men of the third grade; and they, in turn, should delegate their powers to men of the fourth grade, and so on, depending upon the size of the corporation. A definite line of authority is an essential in budget making. The condition exists in many corporations that the President assumes to deal directly with all classes and conditions of men. I have in mind the corporation that has grown up around one man's personality, where the President gives orders at one moment to the First Vice President, at the next moment to a cashier and at the next moment to a man who is handling the cartage in the yard. I am speaking for a line of authority as an essential in budegt making; that is, I am attempting to say, as a challenge to your own thinking, that you cannot set up a budget, let us say, on selling expenses, unless you have some one directly and conclusively responsible for selling expenses. Now if the President is responsible for selling expenses and delegates the responsibility to twelve individuals—to an advertising manager, to a sales manager in the east, to a sales manager in the west, to a copy reader, to a proof setter, to a cashier, and so on, you have such a complete delegation of that President's authority with respect to selling expenses that you can never hope to get budget control on selling expenses. You must have a practicable line of authority.

Budget control does not imply any given kind of organization. Mr. Taylor, in his writings on the philosophy of management, laid great emphasis on functional authority, but budget success does not depend necessarily on functional organization lines. Personally that has always seemed to me to be the ideal line of authority, but I know efficient organizations where the line of authority is from the President to an eastern Vice President, from the President to a western Vice President, from the President to a Pacific Coast Vice

President; that is, territorial responsibility.

The next essential in successful budget control is information independent of the line of authority. If information is entirely controlled in the organization by those who are accountable, there is, indeed, no way to hold them accountable. The line presupposes the staff, and here is one of the greatest obstacles that is to be found in budget making—many business men have little or no use for staff organizations. For one reason, most businesses are dominated by one man who delegates his responsibility to such a large number that there is no line. Where there is a line, then the line often resists the introduction of a staff. By a staff is meant, of course, a group of skilled men so placed within the organization that they can report to the line of authority and to the executive all the information that is necessary in executive accountability. This does not refer merely to an independent general auditor, althought that is a necessary feature if you are to have a successful budget installation. There is also necessity for an independent production engineer, an independent sales engineer, an independent personnel engineer, with the organization; an adequate consulting staff permanently located within the organization as a means of reporting to the line of authority.

I feel like using my entire hour on organization alone, because I have seen so many attempts made to establish sales quotas and expense controls of one kind and another, where the organization rendered accountability impossible; and the whole idea of a budget, to my mind, is a set of estimates as to future accounts that will reflect the policies of the company as a guide to those who have definite responsibilities in executing the policies. There can be no budget control, no policy continuously established, without a line of authority to assist the principal executive. There can be no accountability except in terms of units that are controllable, because it is idle to speak of a budget on the President alone; the budget must be in terms of units that can be controlled, and the chief executive of course is not controllable except in terms of his own resignation. Without a staff provided to accumulate necessary information, there is not a proper basis for accountability.

Granted an organization that can be held accountable, the next consideration is a system of accounting that will hold the organization accountable. As an accountant, I am interested in accounting, but I am interested in accounting only insofar as it enables executives to control. I am not interested in accounts that merely enable the general auditor to account, and I need not emphasize that point in a group of management engineers. Special emphasis is placed upon that, because many "systems" of accounts have no relation whatever to the organization and to control. In fact, if you will refer to the standard treatises on accounting you will find *pro forma* balance sheets and *pro forma* profit and loss statements that are to be used for all classes of business. A proper balance sheet, a proper profit and loss statement, and of course any proper expense analysis in cost accounting must be in terms of specific organization. If you have a territorial organization, if you have a President and he is assisted by a Vice President in the east and a Vice President in the west, it follows, for budget uses, that there will be territorial balance sheets; there will be a balance sheet for the President, on the whole company, a balance sheet on the eastern property under the control of the eastern Vice President, and a balance sheet on the western property under the control of the western Vice President. There must be at least territorial profit and loss statements; the President's profit and loss statement, the eastern profit and loss statement and the western profit and loss statement. To that extent most accountants go, but in a functional organization, one gets into very considerable troubles in accountability. Let us assume that the type of organization is that the President is assisted by a Vice President in charge of sales, a Vice President in charge of production and a Vice President in charge of finance. Where that is the situation, it is seldom that one finds a balance sheet for the use of the Vice President in charge of sales, a differently arranged balance sheet for the use of the Vice President in charge of production, and still a differently classified balance sheet for the use of the Vice President in charge of finance. The kind found generally is a balance sheet for the use of the Vice President in charge of finance; the idea of arranging the assets and liabilities accounts so as to carry a story of accountability to the Vice President in charge of sales does not occur to either the textbook writers or accountants or instructors in accounting and still less to the professional practitioners at the present time. Someone has to challenge that situation, and I am foolhardy enough to try to do it in this audience.

But admitting that it is unnecessary to have a balance sheet that reflects the specific responsibility of the Vice President in charge of production, there should and can be an expense classification that reflects the responsibility of the Vice President in charge of production. I have had the question put to me in my professional practice over and over again, "How do you devise a classification of expenses?" There is only one answer, and that is to draw a chart of the organization. What is the classification of expense for? It is to reflect accountability. Whose accountability? The accountability of those who control within the organization. Well then, you might say, "Why does it happen that most businesses have an expense classification in terms other than those of accountability?" And I am afraid that my answer to that question would be that most organizations, by their accounting, admit that they do not have accountable organization; because, of course, if you do not have a definitized organization, it will occur to no one to set up a definitized expense classification; it is only when you make the Vice President in charge of sales feel his accountability that he will ask for a classification of accounts to reflect that accountability.

There are many types of organization; there are many types of accountability. In a large mail order house, for example, the proper accountability may be territorial, and it may be functional, but it must always be by commodities. Where there is one man in charge of dry goods, another in charge of groceries, another in charge of hardware, another in charge of furniture, then the classification of sales and purchases and inventories and expenses should be in terms of commodity organization and commodity responsibility.

Of course, in actual practice one does not run into theoretical organization. We often hear that a certain company is organized functionally, or that a certain company is organized territorially, or that a certain company is organized by commodities. The actual fact generally is that it is organized on the basis of all three types, and that it is a combination of territorial, functional and commodity responsibility; and that gives the management engineer his main problem in accountability. To those of you who are long experienced in setting up classifications of accounts, this is all basic; to those of you who are not, I want to emphasize that you do not attempt to set up budgets or budget control until you have mastered the classification of sales, purchases and expenses according to the organization that the budget is to serve.

Where you do have accounts that are accountable, that reflect accountability, you are in a position to introduce a budget system. In arriving at a definition of what budget control is, I am unable to approach the subject without considering definite organization responsibility and without considering definite accountability through accounts. Having those two premises, I can then attempt to estimate further possibilities. In other words, if I have a classification of sales by territories, so as to show how much is being sold through the Kansas City office, and how much through the Fort Worth office, and how much is being sold through the San Francisco office, I can hope to set up a budget on the Kansas City territory, on the Fort Worth territory and on the San Francisco territory; but I have no use for budget making on a territorial basis unless there is territorial responsibility. Organization, then accountability, then a budget.

MANAGEMENT WEEK—OCTOBER 16-21

THE management Section of the American Society of Mechanical Engineers, the Society of Industrial Engineers and the Taylor Society have joined in designating the week of October 16-21 as Management Week, a week for joint meetings of their local sections throughout the country. It is expected that every section of these societies will hold a meeting on an evening of that week which will meet local convenience, and that wherever there are sections of two or more of these societies in the same community, the meeting will be a joint one, organized and conducted by a joint local committee.

THE FALL MEETING

THE next meeting of the Taylor Society will be held Nov. 23-25, at the Engineering Societies Building, New York.

The general theme of the meeting will be "Management Lessons of the Depression." Sessions will be devoted to the following phases of the management problem: The Directors and General Policy; The Chief Executive and General Control; Sales Research and Sales Production; The Production Department; Purchasing; Industrial Relations; Business Forecasting.

The annual business meeting will be held Thursday evening, Nov. 23.

SUPERSTANDARDS[1]

THEIR DERIVATION, SIGNIFICANCE AND VALUE

By Frank B. and L. M. Gilbreth[2]

THE value and importance of standards and of standardization as factors and causes of cost reduction is generally acknowledged by all people today, both inside and outside the industries, who have given both the theory and the practice proper investigation and study.

We were convinced of the importance of standards in 1885, but it was not until the late Wm. H. McElwain in 1897 impressed us with the importance of having all minute details of standards put in writing as a permanent record, that we began to put every standard into such permanent record form.

It was not until 1907, at the beginning of our conference with Dr. Taylor, that we decided to emphasize the fact that the *methods of making* the standards themselves should be the first thing standardized. This thought was suggested by the fact that we found there were no two standards in his and our practices exactly alike, even where the objects to be attained were identical. We then decided upon and undertook the course of *intensive superstandardization* and of applying accurate measurement as a prerequisite to making satisfactory standards.

We desire to acknowledge here our appreciation of the great value of the Taylor philosophy, and our emphasis on super-standardization is due in part to Dr. Taylor's emphasis on standardization.

Dr. Taylor's Views on Standards

Dr. Taylor states in "Shop Management"[3]: "It would seem almost unnecessary to dwell upon the desirability of standardizing not only all of the tools, appliances and implements throughout the works and office but also the methods to be used in the multitude of small operations which are repeated day after day." He went on to explain the reason for this, and to show that such standardization was profitable from every standpoint, including that of cost. Since that time, authorities of the management world have accepted the value of standardization, though the world outside management is not yet entirely convinced.

We endorse the above statement of Dr. Taylor and we would especially stress the word "methods," for there has been everywhere a lack of appreciation of the fact that methods as well as equipment must be standardized. We would go further and emphasize the great possibilities for profitable standardization of *repetitive components* of methods, which methods themselves, as a whole, are not repetitive. *The leisurely examination of components of methods, which is now possible, necessary and most desirable, furnishes a completely new viewpoint and practice in standardization, and offers a completely new, fascinating and profitable field for standardization. This field, namely, the leisurely examination of components of methods, covers not only new work, but all old standards that have not been analyzed by the new method.*

Definition of Standard.

Perhaps the best definition of a Taylor standard as so accepted is that given by Mr. Cooke, who says:[1] "A standard under modern Scientific Management is simply a carefully thought out method of performing a function, or carefully drawn specification covering an implement or some article of stores or of product. The idea of perfection is not involved in standardization. . . ."[2]

While the above is a most excellent definition of a standard, it embodies a thought that is quite different from that which we are emphasizing in considering the subject of superstandardization, especially as ap-

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[1] A paper presented at a meeting of the Taylor Society, Philadelphia, March 17, 1922.

[2] Consulting engineers, Montclair, N. J.

[3] A. S. M. E. Edition, Paragraph 284; Harper Edition, Pg. 123.

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[1] Report to the Carnegie Foundation for the Advancement of Teaching, Pg. 6.

[2] Primer of Scientific Management, Pg. 14, D. Van Nostrand Company, New York.

plied to methods. The standard obtained by superstandardization is much more than "simply a carefully *thought out* method." It is of the essence of superstandardization that it be based on the *leisurely examination of errorless records of methods* and of use. Much of all activity is performed too fast for the eye to see. Therefore, the standard as resulting from superstandardization is the best method known of performing any activity. It implies use of the *best units, methods and devices* of research known. To avoid confusion, this new type of standard may be called a "superstandard," tho, ultimately, the old word "standard" must imply the new derivation and use.

Objections to Standards and Standardization.

Occasionally we hear of objections to standards and standardization, and such objections should be considered before proceeding to advocate superstandardization. They have come from those who misunderstood the relation between standards and individuality and monotony. All such objections to standardization have been easily and completely met; not only with accepted theory but also in actual long practice, not only from the standpoint of necessity but also from the standpoint of desirability. While these objections are usually directed against standard methods, they may also be directed against standard equipment or the maintenance of equipment in standard condition.

It is true that there is nothing more monotonous than working under standards that one knows are inferior, and that one can easily improve upon, with no opportunity for making and installing such improvement, or with no recognition for such improvement. Such conditions are ruinous to ambition, to the development of personal and individual expression, and to fostering of the creative instinct and joy in work. They do not exist where standards are adequate and are better than one can oneself devise, and where interest is stimulated and utilized by other parts of scientific management.

Many people are heartily in favor of standardization in principle, but do not themselves practice it. This is especially true of those who have not had wide experience with the simultaneous effects of standardization of method upon large output, lower cost of manufacture, lower cost of living, higher wages and less fatigue. It is not to be expected that anyone will fully appreciate the benefits of standardization who has not studied *super*standardization and had the opportunity personally to see and to appreciate the relations between superstandardization, automaticity, fatigue elimination, learning curves, the stabilization of employment, and lower costs. With this knowledge comes a real evaluation of standardization.

We are here advocating the superstandard and superstandardization. Our emphasis has increased, and is ever increasing, because of the value of the actual results of long years of actual experience with extreme standardization of things and methods. We are practicing and advocating an advance in management technic. The *principle* is the same for all standardization, but the difference in the degree of refinement of method brings about differences in results that are comparable with the expected results of important inventions. To appreciate this difference it is only necessary to review papers and chapters of books on standardization, and to ask: "Is this standard of thing, condition, or method before us the result of guesswork and rule-of-thumb, or is it based upon refined and accurate measurement of the right units?" When examining the printed standards in the literature of scientific management let us not be deceived by beautiful half tones and elegance of printing, efficiency of expression by the editor, or anything other than the measured merit of the subject itself. Let us use *the method of obtaining the results* as a unit of measurement of their value, and rate the work by the fundamental accurately determined facts it embodies. In examining standards of material or equipment, let us note the presence or absence of standards of "practice" as these vitally affect the specifications set down.

The superstandard is a natural development of the standard and a logical part of the growth of management as a science. A superstandard, then, is a standard which is the result of accurate measurement of data relating to the best obtainable, and which embodies the best practice known. It retains all the value of a standard as to means of improvability, but is recognized as the embodiment of the One Best Way extant and a further step toward the discovery of the One Best Way available—at the time. It is well to state here that superstandardization gives special emphasis to fostering and providing temporary, emergency and permanent change toward or from the superstandard, as may be economically wise and desirable. It conserves and develops individuality by the use of the One Best Way Suggestion System, which we have developed with our clients during the last twenty years.[1]

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[1] The One Best Way to Do Work, a paper presented before several Chapters of the Society of Industrial Engineers, May, 1920.

Relation of Superstandards to Standards.

The superstandard supplements and does not necessarily supersede the standard which remains accepted practice during the interim or transitory period. A standard is most useful during the early parts of the installation period,[1] but is developed at the first available moment into the superstandard, which has a far more definite effect upon maintenance, as will be shown later. We desire to emphasize the importance of the relation between superstandardization and maintenance, and to state as our opinion that lack of appreciation and utilization of superstandardization probably is a much greater factor in having installation projects slip back than any other one cause.

Significance of the Superstandard.

The superstandard has great significance from the management standpoint, from the economic standpoint, from the psychological standpoint and from many other standpoints—even from the phychiatric standpoint. From the management standpoint, the superstandard is an indorsement of the philosophy of Dr Taylor and of the underlying principles upon which scientific management rests. It emphasizes the fact that *measurement, not rule-of-thumb,* provides the best working methods. It makes clear the point that during these years when scientific management has developed, our belief in standards has continually strengthened, and never for an instant weakened. It indicates that the growing interest in the human element and consideration of the human element has brought out more clearly the necessity for standardization, if the human element is to be conserved and developed. The close and necessary connection between standardization and such development is some times not understood, even by those who have a deep interest in scientific management, and are in the main friendly to it.[2] Therefore, while it may seem elementary and self-evident to management men, it must be continually pointed out and emphasized.

Significance From the Economic Standpoint

The significance of standardization from the economic standpoint has been recognized ever since the days of Adam Smith and his analysis of the division of labor in 1775. The elimination of waste, that most important of economic questions today, with its effect upon production, distribution and consumption, is vitally affected by the new stress upon standardization. This has been well brought out in the Report of the Committee on Elimination of Waste in Industry,[1] and is an underlying thought in the work of the Division of Simplified Commercial Practice of the Department of Commerce, recently established. The economic necessity of production, once questioned, is today increasingly acknowledged. The relationship between increased production and standardization has never been questioned. The economic benefits of standardization and increasing benefits of superstandardization must be self-evident.

Psychological Significance.

The psychological significance of superstandardization is extremely important and must be carefully considered because it is here that possible objections will be found and should be anticipated. There has been an erroneous and widespread impression among those not personally or intensively acquainted with the best forms of Scientific Management as practiced, that standardization has already increased and will continue to increase monotony, dwarfed individuality, prevented the development of individual self-expression, and is disliked by those who work under it. This is not true and never has been, where scientific management worthy the name has been developed.[2] Any intensive knowledge of the writings and practices of Dr. Taylor himself or of those of the best of his co-workers and followers proves that, consciously or not, the human element has developed to a greater extent under scientific management than under any other type of management. Under superstandardization, such conditions and development are not only conserved but increased, for the proponents of the science of management and executives properly trained in the right theory now utilize the findings of the human sciences exactly as they utilize the findings of the material sciences and apply these findings directly in their own fields.

Intensive investigation is applied to the worker, the surrounding conditions and tools, and the methods or motions used. It is thru superstandardization that the more efficient adjustment of worker to work and of method to worker is accomplished. Accurate measurement in the human sciences is leading to a better understanding of human capabilities and possibilities. Superstandardization in industry is leading to a greater understanding of demands and opportunities. The result is not that individuality is stunted, neglected or misunderstood, but, on the contrary, is appreciated and utilized as it never has been, due to an understanding of, and ability to meet individual demands and capabilities.

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[1] See Process Charts, First Steps in Finding the One Best Way to Do Work. American Society of Mechanical Engineers, Journal, 1922.

[2] Reports of the Industrial Fatigue Research Board, "Time and Motion Study," by E. Farmer, M.A., 1921, pg. 17.

[1] Waste in Industry, by McGraw-Hill Book Co., Pg. 11.

[2] Applied Motion Study—MacMillan Co., Pg. 180-184, 208.

Presumably because some engineers have been thought to be lacking in training in psychology and other sciences that concern the human element, and because industry devotes so much attention to material output, this point has often been overlooked. When it is realized that the engineer's training is primarily in measurement and that the industries offer opportunities which no other field of activity can offer, a new aspect is given to the entire matter. Those outside industry do not always realize that leaders in psychology and other human sciences are today, and have been for years past, devoting themselves to investigations and installations in the industries,[1] and that psychology is increasingly devoting attention to industrial problems. This is well exemplified by the splendid work of the Institute of Vocational Guidance of Barcelona, which recently acted as host for an International Conference of Psychologists, which discussed many practical aspects of the relation of Psychology to Industry.[2] It is also exemplified by such new publications as the "Journal of the National Institute of Industrial Psychology, Founded in 1921 for the Application of Psychology and Physiology to Industry and Commerce,"[3] which aims, as it states in the first editorial, to "describe in non-technical language the methods and results of applying scientific knowledge to the human aspects of industry and commerce." Those in the industries do not always realize that their strength lies not in adhering absolutely to tradition but in adapting the new methods and devices at their disposal to meet the increasing demands of the human element for opportunities and development.

Significance From the Psychiatric Standpoint.

Psychiatry, which has so much to do with the study of human likenesses and differences and with adjustment, has a great interest in the development of superstandardization. The phychiatrist has discovered many types in the industries which for one reason or another are mal-adjusted. This does not mean simply the round peg in the square hole, and does not apply merely to those among the lower grades of employees.[1]

For example, there are two types in the industries differing greatly in some respects from the normal, one of which seems unable, without great difficulty, to acquire automaticity, the greatest of free assets of the normal worker. As a result, he actually has abnormal difficulty in performing an activity twice alike. Another type is that which craves routine and is with difficulty persuaded to attempt to learn or to be changed to another activity, even if such work has better prospects for promotion, or more constant and continuous employment.[2]

Superstandardization of method and of work, or of activity, as some of the modern psychologists prefer to call it,[3] is of greater assistance and value in handling these types. It cannot be too often said that superstandardization, like standardization, aims in no wise to do away with initiative or with individual planning of details in work. It conforms to the principle of separating the planning from the performing, with the best planners in the planning department, and having others who may have to do planning start where the best planners finish. It classifies activity according to the amount of planning that can be done before the activity is started, or according to the amount that must be done during the period of the activity itself. It considers not only all subdivisions of processes involved in the activity down to and including the cycles of motions, but their therbligs.[4] It thus furnishes endless opportunity for investigation of and improvement in detail such as will satisfy the most ambitious inventor, while at the same time it sets aside certain work as within the capability of even those of comparatively low mental calibre, or of abnormal mental activity, and furnishes a market for their ideas, or any self-expression that they may have pertaining to superskill in their narrow fields.[5]

Relation to Fatigue.

Superstandardization eliminates fatigue both directly and indirectly. As applied thru Fatigue Study, it measures all those things that have to do directly with fatigue—and standardizes the best available. This covers length of work and rest periods, working conditions, tools and equipment, desks, work benches, chairs, posture—all that effects efficient work from the fatigue standpoint.[1]

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[1] See Psychology of Management, MacMillan Co., N. Y., V. D. I. Berlin.

[2] Anals de L'Institut d'Orientacio Professional, also "The Place of the Psychologist in Industry," presented at the 2nd International Conference of Psychotechnic, Barcelona, Sept., 1921.

[3] Pub. by Natl. Inst. of Industrial Psychology, 329 High Holborn, London, W. C. I.

[1] E. E. Southard, "The Mental Hygiene of Industry," Engineering Foundation reprint, Series No. 1, Feb., 1920. "The Modern Specialist in Unrest—A Plan for the Psychiatrist in Industry," Journal of Industrial Hygiene, II, 11-19.

[2] "Psychiatry in Industry," Independent, March, 1920.

[3] Eric Farmer, "Time and Motion Study," Pg. 16.

[4] June Bulletin Taylor Society, 1921, Pg. 128.

[5] "Motion Study of Epilepsy and Its Relation to Industry," a paper presented before the "National Association for the Study of Epilepsy," June, 1920. "Motion Study for the Handicapped." Dutton & Co., New York.

As applied thru Motion Study, the improved methods induce efficient habits, reduce to habit all repetitive activities that require no individual decisions, and utilize the finest, most carefully taught type of automaticity. This reduces unnecessary fatigue to the minimum, and leaves time and unwearied attention for those decisions that are necessary and interesting.

Relation to Skill.

Since it concerns itself primarily with elements of motions, as applied to study of methods, superstandardization greatly facilitates the transference of skill. It induces confidence in its results, and determines not only the One Best Way to Do Work, but the One Best Learning Process by which to teach it. This is vital as it affects the problem of industrial education.

Need for Such Superstandardization.

A most superficial knowledge of present day conditions makes clear the need for such superstandardization. The world in general and industry in particular is going thru a period that is extremely critical. The need for increased production, the need for the maximum elimination of waste, the need for stability are everywhere evident. The relation of superstandardization to stabilization of industry and employment is, perhaps, least appreciated. Only one who has many times gone thru the experience of entering a plant that has absolutely no stability or system, and later seeing the changes that have actually been made by carefully installed standardization, can appreciate its benefits. The effects of *super*standardization are similar but more intensive, since the changes made are based upon accurate measurement and are much better founded and carry more weight, as anything known to be absolutely accurate must.

Perhaps the least appreciated benefit resulting from national superstandardization is its effect upon stabilization of employment, for in times of panic manufacturers will be far less timid in manufacturing national standards, knowing that their product will surely be salable at some later date, thus turning their raw stores into assets of greater value, and meanwhile, keeping their labor turnover at a minimum figure.

There has been too much unnecessary and wasteful change in this country based upon nothing but a desire for novelty, and embodying no element of permanence. The losses due to frequent and unnecessary change, for no reason, from one kind of work to another are not realized or appreciated by those who have not had intimate connection with a chart department recording intensive outputs and their causes for fluctuation hourly. The true causes of small outputs, high costs and low wages are never properly known by those who have not investigated the psychological factors affecting change. This does not necessarily mean that there should be no change, or less change; it may mean more change. It means less *unnecessary* change. Changes cost time and money. They may, under certain conditions, be worth the money, but the fact remains, as Adam Smith emphasized nearly 150 years ago, that the great cost of changing from one kind of work to another is almost universally unappreciated. Superstandardization maintains what has proved itself of greatest value, always aiming consciously at the ideal of the One Best Way, giving it the stamp of approval of permanence, and making changes that are definite, progressive and stabilizing, and that will pay in money or in durable satisfaction.

Much work in standardization has been done both in this country and abroad, but this standardization has not applied to methods and has not had in mind the One Best Way to Do Work. A careful investigation of the work of the Bureau of Standards and of the most excellent publications of the American Engineering Standards Committee illustrates this. It is an import aim of superstandardization to bring to the attention of our research bodies the necessity for standardizing the *methods* of industry as well as the *equipment*. There has not been in this country to any such extent as abroad a widespread popular interest in standardization and in the work of those bodies that handle this subject, and it is a second aim of superstandardization to arouse this interest, to foster the work already being done, and thus lead to a more rapid advance in this type of work.

Standardization in Europe.

Europe has made the most astonishing progress in standardization during the past few years because of the realization of the importance of the subject and the general cooperation in its development.

For example, in 1917 the Verein Deutscher Ingenieure, at the suggestion of the German government, organized a central national body, called the Normenausschuss der Deutschen Industrie. Its members are engineering societies, manufacturing concerns, indus-

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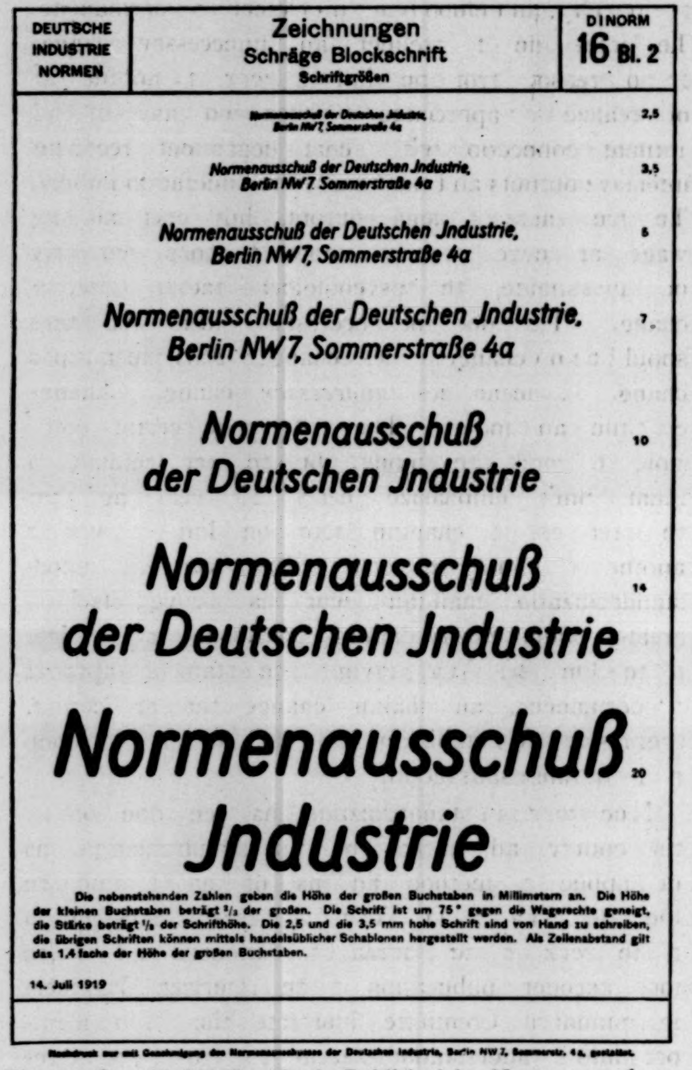
[1] "Fatigue Study," MacMillan & Co., H. M. Vernon. "Industrial Fatigue and Efficiency," Dutton & Co.



DEUTSCHE INDUSTRIE NORMEN

Zeichnungen
Schräge Blockschrift
Schriftgrößen

DINORM **16** Bl. 2

Normenausschuß der Deutschen Jndustrie, Berlin NW7, Sommerstraße 4a 2,5

Normenausschuß der Deutschen Jndustrie, Berlin NW7, Sommerstraße 4a 3,5

Normenausschuß der Deutschen Jndustrie, Berlin NW7, Sommerstraße 4a 5

Normenausschuß der Deutschen Jndustrie. Berlin NW7, Sommerstraße 4a 7

Normenausschuß der Deutschen Jndustrie 10

Normenausschuß der Deutschen Jndustrie 14

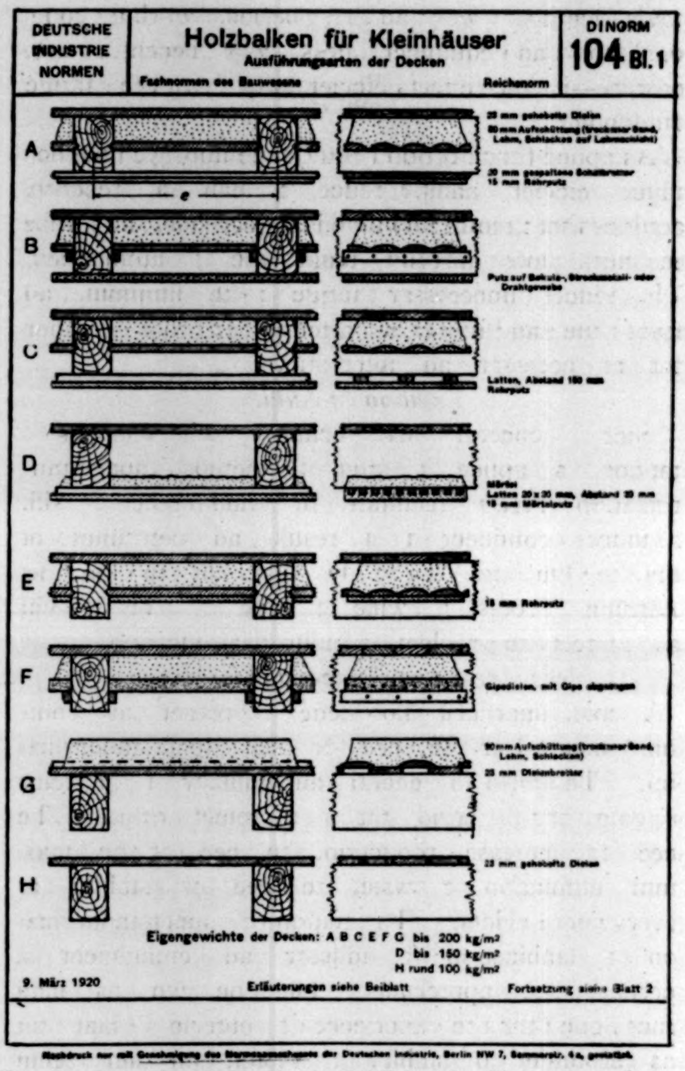
Normenausschuß Jndustrie 20

Die nebenstehenden Zahlen geben die Höhe der großen Buchstaben in Millimetern an. Die Höhe der kleinen Buchstaben beträgt ²/₃ der großen. Die Schrift ist um 75° gegen die Wagerechte geneigt, die Stärke beträgt ¹/₈ der Schrifthöhe. Die 2,5 und die 3,5 mm hohe Schrift sind von Hand zu schreiben, die übrigen Schriften können mittels handelsüblicher Schablonen hergestellt werden. Als Zeilenabstand gilt das 1,4fache der Höhe der großen Buchstaben.

14. Juli 1919

Nachdruck nur mit Genehmigung des Normenausschusses der Deutschen Industrie, Berlin NW 7, Sommerstr. 4a, gestattet.

Fig. 1. One of 144 Standards Published by Normenausschuss der Deutschen Industry (Germany)



DEUTSCHE INDUSTRIE NORMEN

Holzbalken für Kleinhäuser
Ausführungsarten der Decken
Fachnormen des Bauwesens Reichsnorm

DINORM **104** Bl. 1

25 mm gehobelte Dielen
80 mm Aufschüttung (trockener Sand, Lehm, Schlacken auf Lehmschicht)
20 mm gespaltene Schalbretter
15 mm Rohrputz

Putz auf Bekula-, Streckmetall- oder Drahtgewebe

Latten, Abstand 150 mm
Rohrputz

Mörtel
Latten 20 x 20 mm, Abstand 20 mm
15 mm Mörtelputz

15 mm Rohrputz

Gipsdielen, mit Gips abgezogen

80 mm Aufschüttung (trockener Sand, Lehm, Schlacken)
25 mm Dielenbretter

25 mm gehobelte Dielen

Eigengewichte der Decken: A B C E F G bis 200 kg/m²
D bis 150 kg/m²
H rund 100 kg/m²

9. März 1920 Erläuterungen siehe Beiblatt Fortsetzung siehe Blatt 2

Nachdruck nur mit Genehmigung des Normenausschusses der Deutschen Industrie, Berlin NW 7, Sommerstr. 4a, gestattet.

Fig. 2. One of 144 Standards Published by Normenausschuss der Deutschen Industry (Germany)

trial associations and various government departments.

The organization, whose purpose is to foster standardization and to promulgate standards, has attacked many widely separated fields and published much material, ranging from standardization of lines and letters in the draughting room, to standardization of window frames and sashes for many different types of buildings.

During the last four years, 144 of the standards have been actually endorsed, and hundreds that have been issued as tentative standards are being tested and developed. Each standard is embodied in a separate sheet, if possible, so that it can be used as working equipment by the subscriber or purchaser. These standards are supplemented by studies on standardization in all countries that add extensive interest to the intensive information.

Holland has been equally progressive, and the work of the Hoofdcommissie voor de Normalisatie in Nederland is both extensive and intensive. Nothing but a painstaking study of standards issued by these countries can make plain their overwhelming importance. This lies not so much in what they contain, as in what they imply.

Great Britain, Austria, Sweden, Switzerland, Italy, Belgium and Russia, all are at work along these lines.

Europe realizes the necessity of standardization as this country does not. Moreover, other investigators confirm our findings[1] that Teutonic Europe will, partly because of temperament, go into this matter more fundamentally than we of the Anglo-Saxon race will be apt to do, if governed by temperament alone. An unceasing and costly passion for expediency and standards merely for current use has already proved a dis-

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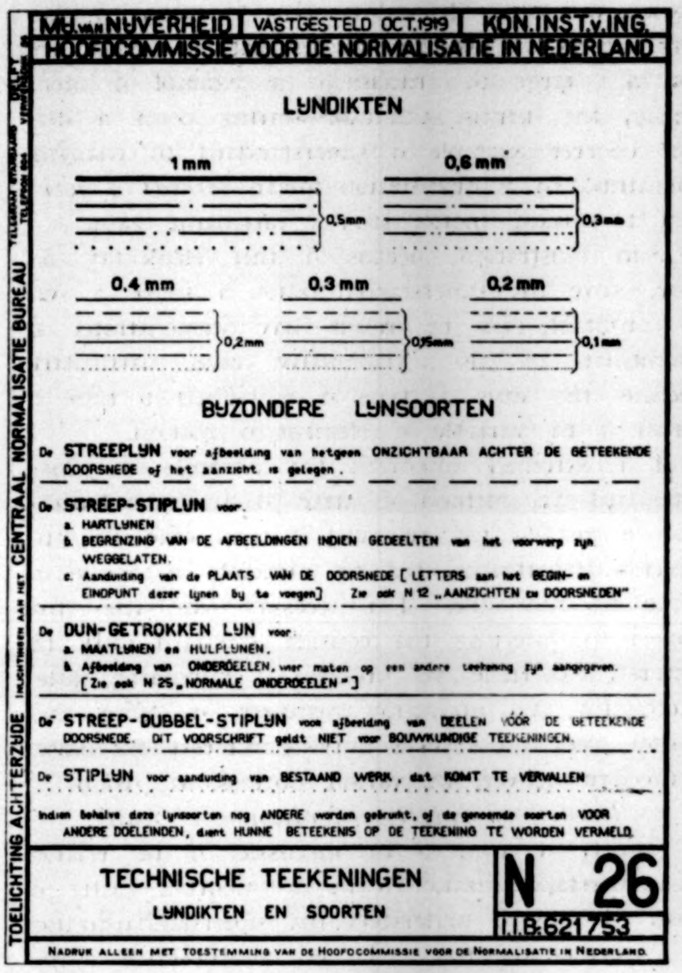
[1] "Engineering and Industrial Standardization," Mechanical Engineering, February, 1922.



MIJ. van NIJVERHEID | VASTGESTELD OCT. 1919 | KON. INST. v. ING.

HOOFDCOMMISSIE VOOR DE NORMALISATIE IN NEDERLAND

TOELICHTING ACHTERZIJDE INLICHTINGEN AAN HET CENTRAAL NORMALISATIE BUREAU DELFT

LIJNDIKTEN

1 mm
0,5mm
0,6 mm
0,3mm
0,4 mm
0,2mm
0,3 mm
0,15mm
0,2 mm
0,1mm

BIJZONDERE LIJNSOORTEN

De **STREEPLIJN** voor afbeelding van hetgeen ONZICHTBAAR ACHTER DE GETEEKENDE DOORSNEDE of het aanzicht is gelegen.

De **STREEP-STIPLIJN** voor.
a. HARTLIJNEN
b. BEGRENZING VAN DE AFBEELDINGEN INDIEN GEDEELTEN van het voorwerp zijn WEGGELATEN.
c. Aanduiding van de PLAATS VAN DE DOORSNEDE [LETTERS aan het BEGIN- en EINDPUNT dezer lijnen bij te voegen] Zie ook N 12 „AANZICHTEN en DOORSNEDEN"

De **DUN-GETROKKEN LIJN** voor.
a. MAATLIJNEN en HULPLIJNEN.
b. Afbeelding van ONDERDEELEN, waar maten op een andere teekening zijn aangegeven. [Zie ook N 25 „NORMALE ONDERDEELEN"]

De **STREEP-DUBBEL-STIPLIJN** voor afbeelding van DEELEN VÓÓR DE GETEEKENDE DOORSNEDE. DIT VOORSCHRIFT geldt NIET voor BOUWKUNDIGE TEEKENINGEN.

De **STIPLIJN** voor aanduiding van BESTAAND WERK, dat KOMT TE VERVALLEN

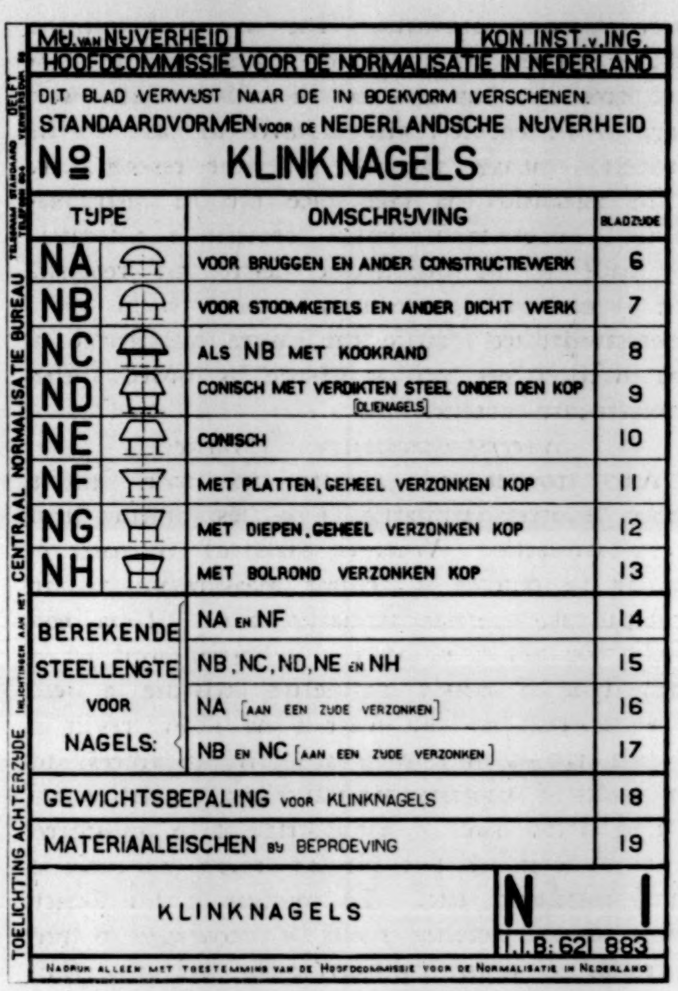
Indien behalve deze lijnsoorten nog ANDERE worden gebruikt, of de genoemde soorten VOOR ANDERE DOELEINDEN, dient HUNNE BETEEKENIS OP DE TEEKENING TE WORDEN VERMELD.

TECHNISCHE TEEKENINGEN
LIJNDIKTEN EN SOORTEN

N 26
I.I.B. 621753

NADRUK ALLEEN MET TOESTEMMING VAN DE HOOFDCOMMISSIE VOOR DE NORMALISATIE IN NEDERLAND.

Fig. 3. Standard Published by Hoofdcommissie voor de Normalisatie in Nederland (Holland)



MIJ. van NIJVERHEID | | KON. INST. v. ING.

HOOFDCOMMISSIE VOOR DE NORMALISATIE IN NEDERLAND

TOELICHTING ACHTERZIJDE INLICHTINGEN AAN HET CENTRAAL NORMALISATIE BUREAU DELFT

DIT BLAD VERWIJST NAAR DE IN BOEKVORM VERSCHENEN.
STANDAARDVORMEN voor de NEDERLANDSCHE NIJVERHEID
No 1 **KLINKNAGELS**

TYPE	OMSCHRIJVING	BLADZIJDE
NA	VOOR BRUGGEN EN ANDER CONSTRUCTIEWERK	6
NB	VOOR STOOMKETELS EN ANDER DICHT WERK	7
NC	ALS NB MET KOOKRAND	8
ND	CONISCH MET VERDIKTEN STEEL ONDER DEN KOP [OLIENAGELS]	9
NE	CONISCH	10
NF	MET PLATTEN, GEHEEL VERZONKEN KOP	11
NG	MET DIEPEN, GEHEEL VERZONKEN KOP	12
NH	MET BOLROND VERZONKEN KOP	13
BEREKENDE STEELLENGTE VOOR NAGELS:	NA en NF	14
	NB, NC, ND, NE en NH	15
	NA [AAN EEN ZIJDE VERZONKEN]	16
	NB en NC [AAN EEN ZIJDE VERZONKEN]	17
GEWICHTSBEPALING voor KLINKNAGELS		18
MATERIAALEISCHEN bij BEPROEVING		19

KLINKNAGELS

N 1
I.I.B. 621 883

NADRUK ALLEEN MET TOESTEMMING VAN DE HOOFDCOMMISSIE VOOR DE NORMALISATIE IN NEDERLAND

Fig. 4. Standard Published by Hoofdcommissie voor de Normalisatie in Nederland (Holland)

tinct menace to the development of Scientific Management.[1]

Our one hope lies in *superstandardization,* in reducing all possible practice to standards based on accurate measurement and on stressing standardization of *methods.* Here America can be supreme, for it already has the knowledge, the method of attack and the equipment to do the work easily, quickly and inexpensively.

The first thing needed in this country is a change of attitude toward the whole subject. It is vital that the entire nation, and especially those directly interested in industrial management, shall appreciate that our safety lies in superstandardization. We must embody the knowledge of accurate measuring devices and methods at our disposal—measures of both the material and human elements—into standards that can sustain world-wide competition—and win.

We must reconsider such controversial subjects as the use of the standards of the metric system and of simplified spelling in the light of these facts. But, even more important, we must apply standardization, beginning preferably where there is no disagreement as to its needs.

By express stipulation, and thru strenuous suppression, this presentation before this Society is made non-controversial. We content ourselves for the present, therefore, by calling for a re-examination of the subjects, methods and results of standardization as embodied in the literature and supposed "best practice" extant, as the final argument as to the need of superstanardization.

Relation to Maintenance.

An immediate effect of superstandardization is the simplification of the problem of maintenance. The significance of this in scientific management is great. Everywhere, those most intensively acquainted with the problems of management are acknowledging the importance of maintenance of conditions of cumulatively improving standards. They have to do with the relation between the consulting engineer and the resident production manager, and the stability of the work begun by the engineer, after he leaves the plant and the production manager takes over the entire responsibility. If the installation has taken place thru the instrumentalities of superstandardization, provision is automatically made for the maintenance desired and requisite. The superstandard adequately applied builds up a superstandardized practice that insures maintenance of that which is best until superseded by proved, better superstandard practice.

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[1] June Bulletin Taylor Society, "Symposium on Stop Watch Time Study."

Superstandardization in Practice.

Altho founded on a better and more definite theory, superstandardization is no less practical than is standardization. Wherever standards are based on and are the outcome of accurate measurement and are in actual use, superstandardization exists. It has been applied not only in all kinds of industrial work but in many types of outside engineering activities as well. It is important not only where it has shown results in a single type of work or in an individual process, for the results of superstandardization are cumulative and nothing is too small or unimportant to be considered or to be worth while to file for review and possible group installation later. The members of this Society and of similar societies should be encouraged to turn in results *no matter how narrow the field of application,* in order that these may be filed and available to all and may be built into a standard common working practice. Also, as has been stated, such measured elements make possible skill transference and fatigue elimination.

Value of Definite Examples of Superstandardization.

An important means toward arousing interest and cooperation in superstandardization consists of definite examples of its application. The plant, the industry, the entire population must be made to *think* in terms of standards. They must be made fashionable and fascinating; they must inspire the beholders with a desire to imitate, the user with a desire to exhibit them and extend their use, for personal and national economies and the consequent reduced cost of living and national prosperity. The standards of method are especially useful here as action is always interesting and leads naturally to imitation.

The cross-sectioned desk, with standard equipment, the standard pencils and supplies rack, the standard rack for inks, the one motion tool room painted white—these have all proved themselves extremely simple, inexpensive thought detonators. Used by many, of general interest, yet seeming to designate no special person as a target for criticism or an example of inefficiency, they furnish admirable starting points as definite concrete examples of superstandards for changing the attitude of an organization toward *methods of work,* and for making motion study a fascinating game.

Such illustrations, because of their elementary nature, prove that superstandardization is simple as well as profitable, and the results have demonstrated an immediate and also a cumulative value, particularly because they cause all types of individuals to think in terms of the variables of elements of motions.

It is extremely important that examples of superstandards and methods of attack of superstandardization be installed that are available to all office and production departments, that the principles be applied in office and shop alike. It is necessary—yes, vital—that papers and meetings that consider standards unify the interest, experience and problems of purchasing, sales, accounting, and production managers, of "office" and "shop" men, and serve as unifying interests and liaison procedure between the various professional groups.

Relation of Superstandardization to Costs.

Finally, we come to the discussion of the relation of superstandardization to the all-important matter of cost. It must be understood that superstandardization is a method of attack. It need not prescribe a new program. It does not attempt to outline a hard and fixed sequence of installations. It does not necessarily attack present practice in any revolutionary manner. It is in no wise a disorganizing or disturbing element. It is a method of stabilizing and securing results. In first cost, like the accurate measurement upon which it rests, it can compete successfully with the too usual and too customary inaccurate methods. In ultimate cost it need fear no possible competition. Because it is a method of attack, it may be applied first where most needed. Its direct product will be the solution of the immediate difficulties. Its indirect product will be a demonstration of its value as a method of attack and the consequent influence as a teacher, making all members of the organization think along these lines. It is not and never can be the possession solely of one man, of one group of men, of one profession or of one nation. It is not merely for current use. It has no boundaries of time or space. The only boundaries or limitations must be those of knowledge. It accumulates all improvements. It is free and available to all who desire to use it. It is true that knowledge of the proper units, methods and devices of accurate measurement are the greatest tools in effecting superstandardization, but many such tools already exist and are available, and as the demand increases, the supply will increase also. The *practice* of superstandardization in a special field of management is a problem for intensive investigation by those best trained for the work. The *theory* of superstandardization is, or should be, a world possession accepted and increasingly used by everyone everywhere. It is the duty of the management engineer who has had experience with standardization, and now with superstandardization, to explain their benefits and to put his experience at the service of thinkers and doers everywhere toward the solving of today's problems and the stabilizing of today's conditions for the benefit of tomorrow. Moreover, an intensive study of standardization in America shows that unless the management engineer takes his natural place as leader in this work he will lose a great opportunity, perhaps forever.

Recommended Practice.

We believe that superstandardization is the One Best Way for obtaining lower production costs and high wages simultaneously. It is the One Best Way and an immediate way, to reduce the cost of living.

This paper is to be followed by another, giving in detail the recent developments in superstandardization, both the latest practice and the theory on which it is founded, and also taken from data at present being collected by personal investigation in England and on the Continent. This will emphasize more strongly the imperative demand for *immediate* superstandardization in this country. It will supplement this present argument, based largely on the inherent need by a more extended review of the external competition.

We would summarize the immediate necessities as follows:

1. The evaluation of existing standards, as to:
    - a, immediate usability.
    - b, place in general plan and development toward perfection,
    - c, accuracy,
    - d, maintenance and full benefits of that which is installed.
2. The promulgation of superstandards in every field of activity.
3. The instruction of young engineers in the making of standards and of superstandards.
4. The advance of those skilled in standardization into superstandardization.
5. The development of the standard, thru accurate measurement, to that point where the "superstandard" of today becomes the "standard" of tomorrow. We cannot afford to stand still.

A RECENT circular of the American Engineering Standards Committee calls attention to the fact that Belgium is another European country which is making great strides towards standardization, particularly in the construction, metals, mining and electrical industries. According to the Association Belge de Standardization, standards for the construction of the following have been approved for issue; steel roof trusses, steel tanks, galvanized and corrugated roofs and partitions, steel bridges, shafts and pulleys, bolts and rivets, requirements for electrical machinery. An electrotechnical vocabulary has been issued and a tentative list of additional proposed standards has been published for criticism.

INDUSTRY in the United States has been in the lead with respect to certain phases of standardization—the interchangeability of parts which enter into mechanical equipment. But that is only the beginning. It will not do for the United States to remain satisfied with past achievement; the movement towards standardization in European countries since the war promises to include standardization of products and of operations involved in their fabrication. What plants with Taylor methods in the United States have been doing for themselves individually, is being done for entire industries in several European countries. It will ultimately give a power in international competition which cannot be ignored.

A CASE OF SALES RESEARCH[1]

REPORT ON FIRST STEPS IN A STUDY OF THE SELECTION OF LIFE INSURANCE SALESMEN

By John M. Holcombe, Jr.[2]

IT is extremely gratifying for anyone interested in sales research to find an organization such as the Taylor Society turning its attention to the sales problem, and I deem it a great privilege to be able to talk with you this afternoon on some of the plans and some of the results which seem to me to be of value in that field. Many of the results are partial and much of what can be said is of plans for the future rather than of actual accomplishment, but this much surely can be said: that executives in American business have come to the realization that their sales problems must be studied with more care than has been the case in past years.

The application of science to the solution of these sales problems and the establishment of scientific principles therein is a relatively recent development in American business. Individual companies and groups of individuals have put time and money into the study of factory and office management, and countless examples exist of research laboratories out of which have come results of far-reaching importance; but all the while the relations of business to the buying public and the problems of how these relations can best be handled have received little scientific study.

There seems no doubt of the need which exists. Here and there we hear comments, for example, that distribution costs are too high and that something ought to be done to reduce them. In recent months many men have endeavored to study certain angles of the sales problem with a view to assisting in the reduction of these distribution costs. As has been well said, "The problems of marketing, like factory problems, must be isolated, abstracted and analyzed after the scientific method." We have used science in securing solutions for our factory problems. The opportunity is at hand to use it for the solution of marketing problems. Cooperation between science and business is apparent in countless branches of American business, and the untouched opportunities in the marketing field for the operation of scientific methods have recently come to the attention of business executives with ever-increasing force.

The Taylor Society is officially described as being "a society to promote the science and the art of administration and of management." Certainly this description is adequate to cover the study of the marketing problems. You can, no doubt, assist the American business executives to see the opportunity that is theirs in studying their sales problems; and you will accomplish this end by clear thinking, by the inspiration of broad vision and by the influence of your example. Your managing director wrote me that there was in your mind this question: "Whether the principles of precise research and resultant principles of precise operation which have been developed in fabrication may not be applicable to distribution." I think that from the studies which you have already had presented to you concerning the quota, you have concluded that there are distinct and immediate possibilities for the application of precise study to the sales problem. I can do no more than hope that the work with which I have been briefly connected in the life insurance business will at least give you a further opportunity to see into the future to that day when science and management in the sales field will have been united as they have been in the field of fabrication.

Out of the gradual development of the common law there has come to be recognized as one of its cardinal principles, particularly in the law of evidence, the difference between fact and opinion. This distinction, so frequently used in legal matters, seems to me to be the distinctive point which is now being recognized in the study of our sales problems. In the field of business, is it not science which causes the substitution of fact for opinion? A sales manager says that certain methods of operation are the best for his company, but does he actually know that they are the best? Is there any way in which he can know? Is there any way in which facts can be substituted for opinion? This seems to me merely to be another way of expressing the question which your managing director tells me has been brought before your Society.

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[1] A paper presented at a meeting of the Taylor Society, Philadelphia, March 16, 1922.

[2] Business Manager, Life Insurance Sales Research Bureau, Carnegie Institute of Technology, Pittsburgh; formerly Manager Sales Research Division, Phoenix Mutual Life Insurance Company.

The field of sales research seems unlimited, for the manifold intricacies of modern operations and the demands thereby made have gradually forced business into wider and wider fields of study, fields not dreamed of by executives as late as ten years ago. In the field of fabrication, there are examples of research resulting in countless new improvements, and in the field of industrial relations, there has appeared the necessity for a study of sociology and living conditions; but in the field of distribution the threshold seems scarcely to have been reached—much less passed. We have faint indications of the gradual recognition of the need in the distribution end of business, of studies in psychology, statistics and economics, but it would be a hard problem to attempt to define the limits of the field for possible sales research work.

It is unquestionably true that the opportunity for selling to the American public has been so unlimited and the factor of competition has in many cases been so small that precise methods of studying the sales problem have not been followed as they have been in other fields of American business. I recall vividly seeing the operations of a lumber company in the Northwest some years ago. The custom then was to cut a tree perhaps ten or twelve feet from the base, leaving a stump of that height which was not used. I was told that the reason was that that lumber was not of so good quality as the lumber in the upper part of the trunk and that it was not worth cutting. We have heard for years of this method of lumbering as being one which would cease as soon as the supply of lumber began to demand more careful methods of operation. It would seem that the same thing is true and has been true for many years in the sales organization of many companies. There has been no absolute demand for the study of distribution costs and for the study of distribution methods. Executives have not thought it worth while. Consequently today the study of interior or factory problems has progressed far in advance of the study of the relations of the company with the buying public.

The number of men who still say, "We keep no accounts, we are successful business men," is dwindling. Few are proud of such an assertion, and yet there are countless men in positions of direction in the matter of sales affairs who say similarly that their business has succeeded without any effort to analyze the differences between salesmen, for example, or without any effort to analyze the possibilities of the territory in which they operate. Consequently their argument is, Why should we change?

Turning now to the application of science to the life insurance business, we have an excellent example of its use, for, as you all know, the studies made for the last fifty years in the matter of selection of risks have produced thoroughly scientific results. There is one distinction between life insurance and almost every other business which is not often discussed, and that is that the life insurance business depends primarily for its success on the type of client which it accepts. In other words, the reason that an application for life insurance asks questions far more minute and of far wider range than is asked of the prospective client in almost any other business is because the client at once becomes an integral part of the company. His acceptance means that his physical and other characteristics are of vital importance to the company accepting him. With this as a foundation, it is easy to see that the life insurance business has to accept its clients with great care, and that this acceptance is based fundamentally upon the operation of the law of average. In fact, the life insurance business is nothing more nor less than a scientific attempt to pool among a group of individuals the risk which comes to one individual, and in this sense it is accurately described as substituting certainty for uncertainty. The business, therefore, has been peculiarly close to all questions of human differences, such as family history and personal history. The recognition of these human differences and the operation of the law of averages has enabled the companies to secure scientific measures such that there is today an accurately calculated premium for each applicant who is accepted by life insurance companies. Actuarial science has therefore grown up from the need to secure a scientific basis for the selection of risks, and those studies are landmarks in the use of science for the solution of business problems. We see life insurance mortality tables quoted frequently, we know that the significance of occupational differences is subject to reasonably scientific measurements as a result of these studies, and the success of the life insurance business has depended largely on the accuracy of the results which the actuaries have turned out.

It was not many years ago that the companies had reached that point in their development where they desired more accurate information on many subjects connected with the acceptance of risks. As I have suggested above, the entire problem is based on the law of average, and until a large group can be studied, accurate results cannot be obtained. In other words, if we are desirous of studying occupation as a factor connected with longevity, we cannot begin to assume that our records are of value until large numbers of cases have been amassed so as to give us an average on which we can base accurate decisions.

It was believed that if the companies should pool their records, they would then secure results far more accurate than could be acquired by one company individually. Accordingly, there was created what was later described as the Medico-Actuarial Mortality investigation, in which the records of about forty companies were pooled and from which came certain reliable facts not previously known. This was particularly true in the study of the significance of height and weight as affecting longevity, as well as in all questions concerning family history and occupation. As a result of that study, companies can carry on their underwriting of risks with much more certainty of the reliability of the rules which they are using than had previously been the case. This study was entirely in the field of the selection of risks and recognized a few fundamental principles; first, the operation of the law of average, and second, the need for cooperation between companies in a study of this kind. I should like to draw your attention later to the possibilities for study offered in the field of the selection of agents and to comment on certain points of similarity between the selection of risks and the selection of agents.

Coming now to the real question under discussion, the sales research problem in life insurance, it is apparent that what we are attempting to do is to use in our study, where it involves the selection of agents, the same law that operates in the selection of risks, namely, the law of average, and to hope that by using this law we can assist the man who must pick out salesmen just as the man who picks out risks was assisted by the study described above.

In the selection of agents, it is only in the last few years that careful study has been given to the possibilities of scientific work. Companies have believed it essential to select their risks with care, and there is no difference of opinion on the need for that study; but the fact of the matter is that a risk in a life insurance company can damage the company only to the extent of the amount for which the individual is insured, perhaps one thousand and perhaps ten thousand dollars. It is apparent at once that the damage which an agent can do to a company is practically unlimited. Whereas a risk is limited in the damage which it can do to a company to the face of the policy, an agent may be responsible for securing countless undesirable risks which the Medical Department is unable to check; he may, in many instances, misrepresent rather than represent his company; and, lastly, he frequently is in a position of trust in regard to the company's funds. There is scarcely any doubt of the need which exists in the matter of studying the question of their selection, and, as we point out above, life insurance companies have been peculiarly active in recognizing human differences among risks. We are, therefore, today asking this question: Shall we not recognize the existence of human difference in the matter of the selection of agents and endeavor to study scientifically this question just as we have scientifically studied the acceptability of risks for the last fifty years?

The work has undoubtedly been damaged by over-enthusiastic supporters, who have claimed far more for scientific methods of selection than can possibly be justified. It seems to be believed that the method is regarded as perfect. Today frequent examples of this damage come to anyone who is studying the problem. Personally, I have frequently been told by sales managers that no scientific method of selecting agents could possibly pick out Agent X who, from all outward appearances, would be a flat failure, but who has succeeded marvelously well in the field where he was put. My answer to it is that neither can the actuary pick out the exception to his mortality table—the man who lives to a ripe old age despite so-called impairments—but that is not what is demanded of the actuary, for it is the group which is used in both cases, and the exceptions to the general rule do not destroy the value of the rule. We are not at present in a position to claim in the scientific selection of salesmen that more than mere tendencies have been discovered. Of these, there are a number to which I shall draw your attention, but which in every case I should like to label as being merely tentative. As suggested above, we are merely at the threshold of the problem and no final results are as yet obtainable.

It has been said that there are four steps in research work: First, to formulate the problem; second, to study the facts surrounding the problem; third, to prepare the plan; and fourth, to operate it. In the sales research work which has thus far been done, we have certainly not passed into the fourth phase of the work and in much of it we are only at the first step. Let us take as the first problem to be discussed the matter of selecting salesmen. The method which must be adopted is to secure from the man when he comes with the company or at some other time certain facts in regard to his personal history and any other fact which can be secured. This is exactly similar to the method used in the study of the selection of risks, in which case the facts in regard to the applicant were secured at the time he was accepted; and their significance was tested in the light of the longevity of the group to which the individuals belonged. Such is the method which is just commencing in the field of selection of agents, where certain facts are secured from each new salesman; and, as he succeeds or fails in the field, this material can be handled in groups and the signficance of those facts determined upon.

In asking such facts of prospective agents, it frequently happens that the personal history blank which a man makes out is criticized because of the fact that questions are asked whose significance is not at once apparent; but it is obvious that the day cannot come when a perfect personal history blank can be prepared until research has shown the significance of each item. Job analysis or some other method must furnish the basis. It may, for example, not appear on the surface just what the relationship is between age at time of entering the business and success in selling life insurance, but it is generally agreed that there are certain limits in age below and above which it seems unlikely that men will succeed in this field of endeavor. Most sales managers in the life insurance business believe that men below a certain age should not be chosen except in occasional circumstances. This, however, is opinion rather than fact. They have no figures from their own or other companies' records proving that such is the fact. They have thought so for years and have operated on that basis. When we have had a sufficient amount of time in which to study the results of the questions asked of new agents, it will be possible to show the significance of the answers. For example, we may ask an applicant how old he is, how many dependents he has, what his investments are or what his previous occupation has been; and in no one of these cases can we tell him exactly the need for asking the questions unless we have had sufficient time in which to study a large group of answers. It would seem that possibly in the years to come the application blanks for any selling or, in fact, other job might well be limited in the number of questions because of the fact that research has shown that certain questions are unnecessary, have no significance and therefore should not be asked of the applicant. But until that day comes, certain questions will be asked of which the significance cannot at the moment be given. When the results on each question have been studied, we can decide whether the question should continue or be dropped. Thus, before many years have passed, it is altogether possible that the application blanks that a salesman will be required to fill out will contain not twenty-five questions to which the salesmanager thinks he would like the answer, but rather one half as many questions the significance of each of which in predicting the probable success or failure of the groups of salesmen has been proved. Of course before the blank can be materially cut down in the extent of its questions many experiments must be made, in order that research can determine whether each question is necessary or unnecessary, in other words, whether it has predictive value or whether it has not. Again referring to the application blanks filled out by all applicants for life insurance, it is generally agreed today that the medical examination, as well as the various other questions which are asked of an applicant, give a very fair indication of the facts surrounding his present conditions which have been proved to have significance. The work along this line has been studied so long that any well-informed underwriter or medical director can justify most questions which are asked on the blank, but it was probably many years after the first application blank which requested of the man information regarding his height and weight, for example, that a scientific study of height and weight was made. In the study referred to, already made by the combined experience of about forty companies, it was discovered for the first time that the analysis of height and weight showed that the best mortality records were attained in the case of extremely young people by those who were slightly overweight. This study showed that as age increases, in the older years it is the underweight who has the best mortality. That cooperative investigation furnished a new but scientific basis for underwriting, and companies in general today as a result of it view favorably young men who are overweight and older men who are underweight; whereas in previous years there had been no such scientific facts on which to base the operations of the underwriting department. Today they know that the groups of young men who are heavier than the average for their age outlive the group which is lighter, and that exactly the reverse is true of older men.

There have been several studies already made whose results, although tentative, are interesting, in the field of selecting salesmen. For example, in the matter of age, the experience of one company is that men entering the business below twenty-six show distinctly inferior results, as a group, in comparison with men from twenty-six to forty, and of the men between those ages of twenty-six and forty, the best group is that from thirty-one to thirty-five. Men entering the business above the age of forty show results not much better than those below twenty-six. In other words, this is of value to the man picking salesmen because it focuses his mind on the fact that the most likely ages for him to find his salesmen are between those limits. There are few, if any, sales managers who would take those limits as absolute and reject all men below twenty-six or all men above forty, but this method at least focuses his attention upon the subject of age and gives him a guide-post of value. Furthermore, in continuing this particular study, the companies found that in the ages mentioned above, namely, twenty-six to forty, the percentage of men accepted who became outstanding successes was much higher than in the other age groups, namely, those below twenty-six and those over forty. In other words, those age groups produced the best results as regards moderately successful men, and in particular the high grade men were shown to fall within those groups to a far greater extent than was the case in the group above and below those age limits.

Another study which was made showed that increasing years of experience since leaving school and prior to entering the life insurance business gave increased success after becoming life insurance salesmen. This, of course, is linked up with the question of age, because a man who has been ten years out of school is naturally in a higher age group as a rule than a man who has just finished school. However, business experience is obviously of very great importance in the matter of selling.

Another much mooted point on which some indications have been secured is the matter of schooling. Here there has been among various sales managers a wide difference of opinion as to whether the college men secure better results than the high school or than the grammar school men. In general, it can be said today that the question is unsolved so far as facts are concerned, though in the minds of many men a few particular cases which stand out in their recollections have solved the case for them. There is much yet to be learned about the significance of schooling in regard to predicting success or failure in the selling field. One company has given evidence that college men have done materially better than the others and there are at least a few other companies which have had rather different results. It can be said that this problem has such contradictory evidence that there is no scientifically sound basis on which to form even an opinion.

Still another factor which is usually asked on an application blank and which has been studied recently, is the amount of insurance which a man carries on his own life. It is obvious that this would appear to have a logical significance. In other words, if a man does not carry life insurance on his own life, it seems improbable that he will be able to talk with as much force as a man who has himself been persuaded of the value of life insurance to the extent of carrying some himself. This is amply borne out by the few cases which have been studied which show that the men who carried no life insurance at the time of becoming agents do materially poorer work as agents than the men who carry insurance and that with increasing amounts carried by agents at the time of entrance into the business, added success comes to them when they go out and sell policies.

The matter of marital status has long been debated and many sales managers of life insurance companies have believed that the married man is distinctly superior to the unmarried. In the matter of dependents, one statistical study which was made showed that each additional dependent seemed to predict slightly increasing success in the field. An interesting fact in this regard was that when men had more than four dependents the success seemed to drop materially. In other words that men with three dependents did better than men with two, and that men with four dependents did better than men with three, but that men with more than four did materially poorer work. The group on which these studies were made was, however, not sufficiently large to make these conclusions of material importance.

I recall hearing one man, of great experience in personnel matters, say that he always endeavored to hire salesmen who were dark complexioned, tall, and stockily built. I do not think that he had any scientific foundation for his opinion; in a study which was recently conducted, it appeared that the very short men did not have the success that the men of five feet nine and ten had. This is an interesting fact, if true, for there have been many opinions as to the significance of height and weight. In the study to which I refer, the men of five feet nine and ten were the best, being materially better than those shorter or even than those taller. The shortest men, namely, those below five feet seven, had the poorest record of all.

These studies prove at least one thing: that life insurance companies are beginning to see that there are significant differences among salesmen which are subject to study. In the past, the organization of the sales force of a life insurance company has been on a very decentralized basis. In fact, the life insurance sales force has been about as much decentralized as any sales force. The Home Office has appointed general agents in various sections of the country and has expected these general agents to secure results; but the exact manner in which those results have been secured—whether by few or many salesmen and whether in country or city territory—has largely been left to the judgment of the general agent. The result is that each general agent has had a small sales force of his own, whose selection, training and compensation has been largely a matter which he alone supervised. Gradually, however, tendencies have appeared in which Home Offices have taken increasing cognizance of the methods of operation employed by general agents, and this has resulted in the possibility of studying large groups of salesmen. Very few general agents hire a sufficient number of men to make accurately any such studies as we have outlined above. Nor in most cases does the Home Office employ enough salesmen, even in the entire country, to warrant such a study. Today we hear much about scientific selection and adequate training of life insurance salesmen. It is not my province this afternoon to discuss the advantages of training, nor the advantages of certain methods of selection, but the significant point is that the tendency is all in the direction of making the study as scientific as possible, both in selection and in training.

Coming now to still further developments in the matter of selection, I should like to offer for your consideration several charts based on certain studies which have been recently made. These studies are aiming at the same thing which we have already been discussing, the extraction of the significant facts in regard to new agents and the study of the group with a view to predicting failures before they enter the business and therefore eliminating them without the expense involved in selecting and training them.

It has been believed that some sort of a scoring system could be devised whereby all the facts secured from the man on his personal history blank or from some other source, could be combined into one total and that possibly some total score could be given, the significance of which could by study be determined. I shall not attempt to go into the details of the working of the formula in securing the score on these various items. I think I can explain the general terms sufficiently accurately so that you can follow the method. We took the personal history record made at the time the man came with us on several hundred cases and applied an arbitrarily selected line to separate the successes from the failures. We then threw our cases into groups according to their ages, for example, taking all those of a certain age group and lumping them together. By means of a statistical formula, it is possible to find a rating to be given on the several items. For example, in the matter of age we were able to determine that our salesmen showed such success or failure according to age at entry that we built up a scoring system from the records we had available. Having done this on ten or a dozen items we were able to make a composite score. This scoring, it should be remembered, has been secured from the record of the men that were available. In other words, we are using a sales record to build a score which we would use on the personal history records that we secure on future men. The results of this investigation can be shown by several charts, the first of which is entitled "Evaluation of Personnel Items." (Chart 1.) At the extreme left of the chart you will see that there were 447 men studied, and that of these 447 men, 56 per cent were successful, according to the dividing line between success and failure which we adopted in the beginning. What we desire, of course, is to find out what the significance is of the age of the men whose records are being studied. In our first group is included the men who were below twenty-four years of age at the time they commenced selling. In this group we have the records of fifty-three men available and of of those 49 per cent were successes. In other words, there is a difference from 56 per cent, which was the record of the total group, to 49 per cent which was the record of these men below twenty-four. A smaller

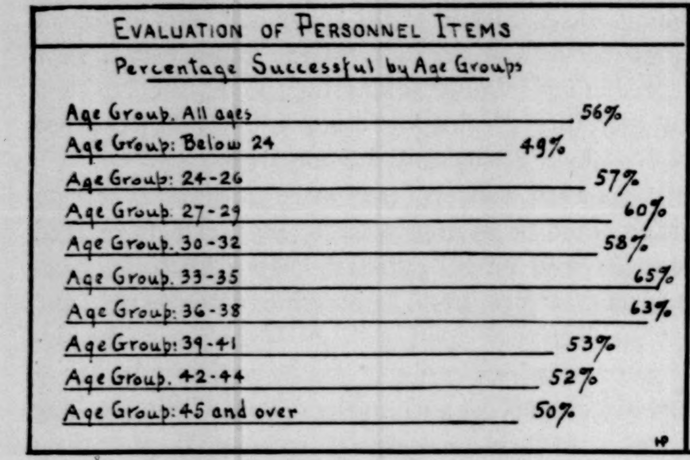

Chart 1

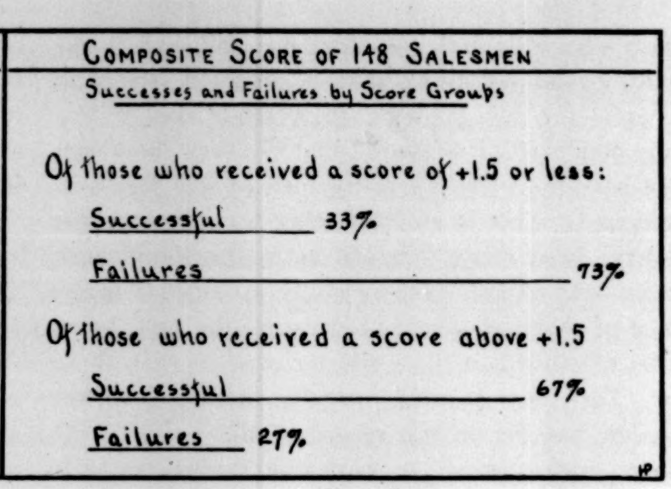

Chart 2

percentage of the men below twenty-four were succeeding than were succeeding in the total group of 447 men. Taking the next group, age twenty-four to twenty-six at the time they commenced selling, we find that 57 per cent were succeeding as against 56 per cent of the total group. This shows that men of that age are succeeding slightly more frequently than the groups taken as a whole. Our next group, twenty-seven to twenty-nine, shows that 60 per cent were succeeding. The next group shows a slight dropping back in its percentage tendency, but the two groups which show the best record are those from thirty-three to thirty-five and from thirty-six to thirty-eight. The remaining group at the right of the chart drop off quite rapidly until we find that the top group, forty-five and over, has a record practically identical with the men below twenty-four. Applying the statistical formula, the details of which I shall not describe, to this group, we are enabled to secure the following results. To all men below twenty-four, we give a minus 1 score. To men from twenty-four to thirty-two we give no score. In other words, they are regarded as neutral in this particular point. To men from thirty-three to thirty-eight we give a positive score of one. To men from thirty-nine to forty-four we give no score and to men above forty-five we give a minus score of one. I am not in any way attempting to claim perfection for this study and in fact desire merely to present it for your consideration. It would seem that the method adopted of placing a score on the items which can be secured is of predictive value. There are probably sales managers who would view this study as being an attempt to prevent them from exercising judgment. This is clearly not what is desired. The only thing we are attempting to do is to assist the sales manager of any business in directing his attention to certain groups of people who, from experience, are shown to have certain records. There are many times when a sales manager is puzzled as to whether a man should be accepted or should not be accepted. If some such scoring system as the one outlined here could be placed upon his desk it might assist him in making his decision. In no sense of the word, however, should it be felt that this scoring system, at least at present, should eliminate the question of personal judgment. Perhaps the day may come when some such mechanical system as this can be applied and all will bow to it, but certainly no such result has as yet been secured. Furthermore, we cannot prove the accuracy of this system, for it has not yet been tried out on a sufficiently large number of cases to warrant the belief on anything but a tentative basis that it will produce results. What is hoped for is that the turnover of salesmen, which in many companies has been a serious drain on the resources of the sales department, can be materially reduced by some such system as this, which can be followed year in and year out with hundreds of cases and will in the long run assist the sales manager in picking successful salesmen. That shows the result with respect to one aspect—the age of the agent at the time he became associated with the company. Other items which we have been securing on our salesmen and which we put into our composite score are: marital state, number of dependents, insurance held at entry, schooling, number of years out of school, previous insurance selling, previous general selling experience, number of outside organizations to which the man belongs, number of investments he holds, whether he owns his home or rents it. On each of these we secured a scoring system similar to one which I described for age. The result is shown on the accompanying chart entitled, "Composite Scores on 148 Salesmen," (Chart 2.) The reason this number has

COMPOSITE SCORES OF PERSONAL HISTORY ITEMS

148 Representatives Having 6 to 35 Months Experience

Scores→	-7.5	-7.0 -6.5	-6.0 -5.5	-5.0 -4.5	-4.0 -3.5	-3.0 -2.5	-2.0 -1.5	-1.0 -0.5	+0+ +0.5	+1.0 +1.6	+2.0 +2.5	+3.0 +3.5	+4.0 +4.5	+5.0 +5.5	+6.0 +6.5	+7.0 +7.5	+8.0 +8.5	+9.0 +9.5	+10.0 +10.5
500 and over							x		x		x	x		x	xx		x		
350 499						x			xxx	x	x	x	xxx xxx			xx	x	x	xx
250 349			x						xx		xxx	xx	xxx xx	x	x	xx	xx		
175 249					x	xxx	xx	x	xx		xxx	xxx xx	x		xx			xx	x
125 174			x	x		xx	xx	x	xx xx	xxx	x	x	xx	xx	x		x		
85 124				x	xx	x	x	x	x	xxx xx	x	x	xx	x		xx			
50 84	x	xx	x	x	xxx	x	xxx					xx	xx	xx					
0 49			x		xx		xx xx	xx	xxx	xx	xx	x	x		x			x	

Chart 3

been reduced from the total of 447 on the age group is because there was not complete information on more than 148 men. Taking this group, you will see that the horizontal line running through the center separates the successes from the failures. The vertical line separates those receiving on their composite score over 1.5 from those receiving 1.5 or less. We are, of course, endeavoring to find a system whereby we can predict with some accuracy the probable success or failure of the men whom we choose; and the scoring device, when completed, will be used on the papers of new men which are received. By looking at the chart you will see that seventy-six men received above 1.5 on their composite score. Of these seventy-six, sixty-one proved to be successes, namely, 80 per cent. Of the men receiving scores below 1.5, thirty-one out of seventy-two succeeded, or 43 per cent. In other words, if we were using our scoring system on a group of new men and the results were as here shown we should be selecting a group of whom 80 per cent succeeded, while we should be rejecting a group where the successes were only 43 per cent.

Looking at this in another way you will find that ninety-two men out of the total group were successes, of whom sixty-one, or 67 per cent secured above 1.5 on this score. You will also notice that there are fifty-six failures in the group, of whom only 27 per cent received above 1.5. It is apparent, therefore, that the score of 1.5 is a significant dividing line between success and failure, and if any system could be devised which would successfully year in and year out divide the future successes from the future failures on any such proportion of cases as we are here showing, it is clear that some step in the direction of scientifically determining probable success would have been reached.

Taking another chart on the same 148 men, we have classified them according to various degrees of success. (Chart 3.) The figures at the left of the chart designate the result in certain units of measurement which men are achieving in their selling experience. They range from 0 to 500. Along the bottom of the chart are the scores which have been assigned by the formula described above to the men whose records are being studied. If there were an exact relationship between the score which we have assigned and the success in the field you would find all of the dots, each one of which represents a man, ranging from the lower left hand corner to the upper right hand corner without any variation. In other words, the lower the score made on our scoring system the lower the success in selling. This, of course, is not wholly true, but you will notice by glancing at the chart that in general the tendency is from the lower left hand corner to the upper right hand corner of the chart which is technically known as a scatter diagram. Several suggestive things stand out in this chart. Taking the extreme cases, for example, you will find that of the men who secured 500 and over in selling units, as shown by the figures at the left of the chart, there is not one who secured a score according to the formula of less than —2, whereas the bulk of the men who secured the high result of 500 points and above received scores from 5 to 8. Looking at the left hand upper corner of the chart you will see that there are few men represented there. If there were little or no relationship between the score secured and the results achieved in the field, you would find numerous dots in the upper left hand corner and the lower right hand corner because you would have men who received a low score and who succeeded in the field, whereas, men with high scores failed. If you look at the lower right hand corner you will see that there are few represented there, although we have one extreme case where a man received a very high score according to our formula and then failed miserably in the field. Perhaps there is some particular fact concerning this man which would explain it, but he is clearly out of line in comparison with most of our men. The chart shows that we have developed something which has real predictive value.

In the company with which I have been connected, we have done several other pieces of sales research work, chief among which has been an attempt to set more accurate quotas for our various agencies than had previously been set. In that connection we have secured the relationship, by the mathematical method of correlation, between the sales of life insurance and other measures of wealth, such as automobiles, telephones, savings bank deposits, post office receipts, etc. We have learned that some of these measures bear a strong relationship to the sales of life insurance, whereas others appear to follow different lines. I cannot give you anything of value, however, on the quota question, for it seems to me that from Mr. Staubach's papers you have received far more valuable information in regard to possible methods than it would be within my power to give you.

There are certain other factors in territorial analysis which we are attempting to develop. One of them is the study of the purchasers of life insurance, not from the point of view of their physical make-up, which has already been studied by the doctors in great detail, but rather from the point of view of their position in the business world. The study to which I refer takes account of a man's wealth, income, amount of other insurance already carried, nationality, suburban or rural residence, etc. We have not yet reached the point where the result can be used, but what we are attempting to do is to find the significant facts in regard to the applicants who are accepted along the lines mentioned above. In other words, what significance is there from the point of view of the sales manager of the class of men to whom his salesmen are going? If there are differences among prospects from a medical point of view, certainly there may be differences from the sales point of view, and we hope before many years to be able to show some significant differences along the lines mentioned above.

All of this research work aims at one point, namely, the better distribution of goods at decreased cost. There are many concerns which have excellent cost accounting systems and there are many concerns which have not, but there are few which today have exhausted the possibilities of securing large results from more careful studies in the field of distribution. I have discussed this afternoon only a few of the possibilities, for, in addition to those mentioned, the opportunity is at hand to study the complete organization of the central sales department as well as the organization of the branch offices scattered through the country. What measuring stick can be put against the results attained by those organizations? What methods can be substituted for those which study shows to be wasteful? In short, what can scientific investigation do to make the machine run better and at decreased cost?

Before leaving this subject of sales research, I should like to have your permission to sketch the most recent development in this work among the life insurance companies. Much of the work which I have described above resulted from the contact between the company with which I was connected and the Bureau of Personnel Research at Carnegie Institute of Technology. There have recently been brought together a group of about thirty life insurance companies who desire to study on a cooperative basis some of their sales problems. The difficulty which one meets constantly throughout such studies has been the difficulty of analyzing a sufficiently large organization so that we can rely on the results secured. It is particularly true in any small company where, in the matter of selection of salesmen, there are no records which are of value because so few men are hired that no precise results can be secured. With the idea in mind of studying the various sales problems, about thirty companies have joined together on a cooperative basis and there has been established at Carnegie Institute of Technology a Life Insurance Sales Research Bureau. At a recent conference of these companies, various questions were discussed, and it was agreed that for the time being a few main problems will be studied. First, the problem about which I have talked with you this afternoon, the selection of salesmen. In that particular, it has been agreed by these companies to pool the records which are available to the end that some scoring system or other device be secured such as I have described. It is not, as I have already indicated, with any belief that this system will eliminate the use of individual judgment, but rather with the idea that the individual judgment may be guided in many cases by the erection of such guide posts as I have discussed above. If, instead of one hundred forty-eight cases, we had ten thousand, we would then have such accuracy as is possible in the mortality tables. Similarly, if we could secure from the companies, thousands of cases instead of a dozen in regard to certain other factors in the sales research field, we should be able to rely on the results with absolute accuracy, for the law of average is the underlying factor in all this work.

The other major problem which the Life Insurance Research Bureau is to attack is the study of the general agents. As I have said before, the life insurance business is operated largely through general agents, under whom sub-agents have been appointed. The selection of general agents is a matter of vital concern to the life insurance companies. But today relatively little careful study has been given to the job of the general agent. The greatest care has been taken in the selection of risks, the next greatest care has been taken in the selection of local or sub-agents and the least scientific care has been taken in the selection of general agents, though of course the responsibility of the latter is far greater than the responsibility of the sub-agents. As has been often proved, one of the primary requisites in personnel work is the job analysis as a basis for the proper placing of employees. This, at the moment, is claiming the attention of the Life Insurance Research Bureau, and it is hoped that within a short time some job analysis can be given of general agents which will be of value in the final problem which is being attacked, namely, the selection of general agents.

Concluding this discussion, I should like to comment again on one fact—that the field for sales research has barely been entered, that the results so far achieved are mere indications of what may come in the future, and that stimulation of imagination is what is needed today, together with the most accurate thinking which can be secured. It was Napoleon who said that imagination rules the world. Certainly the opportunity for the use of imagination in the study of sales problems is unlimited, but a requirement in conjunction with imagination, is clear thinking. Loose methods of thinking give loose results. The Taylor Society stands for accurate results achieved through accurate thinking. It is my hope that as the years go on this Society may be constantly in the forefront of the careful thinkers on sales problems. Your discussions for years have been of great assistance to the study of interior management. May they in the future be of equally great value to the sales manager, the man whose job goes outside the four walls of his factory or his office and delves into those manifold difficulties surrounding the relations between his company and the public. For some years the sales phase of management is bound to be dominant.

SCIENTIFIC Management is a term which can no longer be used in its exclusive application to the world of industry and production. Its fundamental principles are becoming better known and more widely applied to the field of retail merchandising, particularly in the large department stores. . . .

The time will come when the business of merchandising is looked upon as a science equal to any of the professional lines. The advancement of that day can be materially hastened by a greater amount of study and planning on how the Taylor principles can be applied to the business of retailing. Many of the principles are directly applicable, whereas others must be somewhat modified. After careful consideration the writer believes they may be summarized as follows:

1. The careful selection and proper training of the employee.
2. The development of standards in the amount of work to be accomplished.
3. The payment of a wage sufficiently high to attract and hold the better class.
4. The recording of essential information in a systematic and efficient manner.
5. The intelligent planning for the future.

(John M. Van Voris, formerly with The Halle Brothers Company, Cleveland, in *Administration,* May, 1922.)

THE PRACTICE OF MANAGEMENT ENGINEERING IN THE STATE OF NEW YORK

CHAPTER 581 of the Laws of New York became a law on May 5, 1921. It is entitled "An Act to amend the general business law, in relation to the licensing of professional engineers and land surveyors, generally." The essential points are as follows:

1. From and after May 5, 1923, ". . . any person practicing or offering to practice professional engineering or land surveying in this state shall hereafter be required to submit evidence that he or she is qualified so to practice, and shall be licensed as hereafter provided. . . ." (Paragraph 37.)

2. ". . . .the following facts established in the application shall be regarded as prima facie 'evidence, satisfactory to the board,' that the applicant is fully qualified to practice professional engineering. . . ." (Paragraph 39e)

(a) "Six or more years of active engagement in professional engineering work, one of which shall have been in responsible charge of work. . . ;"

(b) "Graduation, after a course of not less than four years in engineering from a school or college approved by the regents as of satisfactory standing, and an additional four years of active engagement in professional engineering, one of which shall have been in responsible charge of work. . . ."

(The above seem to be the essential points, but interested persons are advised to read the act carefully.)

For the benefit of the members of the Taylor Society the following correspondence is called to their attention:

TAYLOR SOCIETY
A SOCIETY TO PROMOTE THE SCIENCE AND THE
ART OF ADMINISTRATION AND OF MANAGEMENT
29 West 39th St.
NEW YORK

April twenty-seven
1 9 2 2

State Board of Licensing for
Professional Engineers and Land Surveyors,
State Education Building,
Albany, N. Y.

Gentlemen:

It is one responsibility of this Society to inform its members through its Bulletin, concerning matters of professional interest. Among such matters is Chapter 581 of the laws of New York entitled "An Act to amend the general business law in relation to the licensing of professional engineers and land surveyors, generally." There are certain possible applications of this law which are not definitely clear in the wording of the act itself, and on behalf of our membership I take the liberty to ask you for certain interpretations.

1. Throughout the act the term "professional engineer" is of great importance, for instance in paragraph 37 we find "any person practicing or offering to practice professional engineering," and in paragraph 39-n we find "a person practices professional engineering . . . who holds himself out as able to do, or who does, the work that an engineer does. . . ."

Question 1. Does the term engineering as used in this act comprehend such professional activity as is described by the terms industrial engineer, management engineer, consultant in management engineering, methods engineer, etc.; and is it necessary that individuals who offer professional service under the above designations be licensed by your Board?

Question 2. Assuming that the answer to the above question is yes, would the same requirements apply to individuals who offer a similar service, but who do not use the word engineering indicating such service; for instance to individuals who offer their service under such designations as consultant in management, industrial counsellors, etc.

2. In various paragraphs of the act we find as a qualification for securing a license, graduation from or attendance at an engineering school; for instance in paragraph 39-e 1 (b) the following: "four years in engineering from a school or college approved by the regents as of satisfactory standing. . . ."

Question 3. Assuming that question one above has been answered affirmatively and that industrial engineers must be licensed, must such industrial engineers be graduates of engineering schools in the strict and generally accepted meaning of the term engineering schools; for instance such schools as Massachusetts Institute of Technology, Stevens Institute, The Engineering School of Cornell University, the Schools of Mines, Engineering and Chemistry of Columbia University, etc.?

Question 4. If question three is answered affirmatively what avenue to the practice of industrial engineering would be available to students of such schools as the Graduate School of Business Administration at Harvard University, The Amos Tuck School at Dartmouth College, The Wharton School of Business at the University of Pennsylvania, the School of Business at Columbia University, and New York University?

3. It should be observed that the above questions concern a class of professional men who use the term engineering in announcing their service, but who may not practice civil engineering, mechanical engineering, electrical engineering, ventilating engineering, or any of the old line types of engineering; and who are not graduates of regular engineering schools. The questions are pertinent for the reason that professional training for what might be called business engineering is being provided by such institutions as are mentioned in question four rather than by regular engineering schools.

Very truly yours.
(Signed) H. S. PERSON,
Managing Director.

THE UNIVERSITY OF THE STATE OF NEW YORK
THE STATE DEPARTMENT OF EDUCATION
ALBANY

Mr. H. S. Person, May 11, 1922.
Managing Director,
Taylor Society,
29 West 39th St.,
New York City.

Dear Sir:

Your letter of April 27th has been referred to me for reply, and I answer your questions seriatim:

1. Persons using the word engineering with such modifying adjectives as industrial, management, methods, etc., in my judgment are making an unwarranted use of the word engineer.

2. You have the solution of the matter. Such persons should cease to use the word engineer and offer their services as consultant in management, industrial counselors, etc.
3. Having answered No. 1, No. 3 is also answered.
4. Graduates of such schools as you mention are not engineers within the meaning of the term.

Cordially yours,
(Signed) AUGUSTUS S. DOWNING.

THE FACTOR OF TIME IN DEVELOPING SCIENTIFIC MANAGEMENT

I MUST take very strenuous exception to the statement in the editorial "Now Is the Time," in the April BULLETIN, that results from scientific management are slow of attainment.

If the writer of the editorial is comparing scientific management with the spectacular "efficiency" plan of running through a plant and suggesting changes that can be wrought in a minute, no doubt this allegation is correct. But only an extremely poorly managed plant is susceptible to "efficiency" treatment.

Let us consider the facts first from the broad standpoint. A few plants throughout the country stand out and are referred to widely in press and platform as examples of good management, of satisfactory labor conditions, of successful operations. Examine these plants and you will find literally without exception that they have attained this position through scientific methods of development.

Just now we are not interested, however, in these more perfected results. What the manufacturer of 1922 and of 1923 must consider is the development of plans in his industry and in his own plant that will get the immediate results.

Is there any plan under the sun that can attain results so quickly as the scientific method of attack and development? By "results" we do not mean moving a machine here and there because we can see by superficial examination that it will save labor, nor do we mean the speeding up of operatives by direct or indirect threat of discharge. We mean the really permanent results which accrue from methods that eliminate unnecessary labor, reduce waste, aid the flow of work and materials, balance operations, eliminate internal labor friction, that in fact actually reduce costs and increase production per man in a large measure. All of these can be brought about quickly only by a scientific method of attack and by scientific development.

A few minutes' thought will show why this is true. Scientific attack means a definite study to determine the operations needing attention, leading frequently to an entirely different selection from that first thought of. Next, there is direct concentration by skilled analysts on these vital problems. In the third place, developments can be made with the aid of experienced engineers that have been proved out elsewhere as satisfactory and require no experimenting. Taking special operations or individual departments or even the entire plant, it is a matter of weeks instead of months, or months instead of years, or years instead of centuries, as compared with the haphazard methods of cut and try selection.

In these statements we are not decrying the necessity for thoroughness. We indeed are emphasizing it. We are not disputing the fact that in many operations, such as certain processes in a machine shop, it may take many months or even years to approach thorough development by any method in the world. But even here the scientific method is the quickest one, in fact in such cases as these often no other method will produce real results in decades of operation.

However, in such cases, requiring the most fundamental treatment, it is possible to find certain vital points where scientific analysis and concentrated study can show how to effect unthought of improvements resulting quickly in effective savings and reductions in cost.

In one way the haphazard method can get there more quickly. This is in the setting of piece rates by snap judgment based on past records. If one wants to set piece rates over night, he has no time for scientific management. But quickly set, quickly thrown down! More and more the manufacturers and workmen are realizing that such haphazard work always results very quickly in dissatisfaction and injustice, and should not even be thought of, in fact cannot be considered as permanent development. Even here, however, the scientific method will find means of improving methods quickly and getting definite results while the more thorough studies are being made. Case after case can be cited where this plan has worked out.

Finally, we must not forget that the scientific method is the only one that produces permanent and accelerating results which lead to the development of a spirit and an organization within the plant that learns how to attack problems quickly, to find the cause, and to effect the remedy.

SANFORD E. THOMPSON.[1]

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[1] The Thompson & Lichtner Company, Boston.